From the house of **Amar Chitra Katha** and **Tinkle**

BRAINWAVE™

PLAY WITH SCIENCE!

Vol. 04 Issue 01
January 2015
44 pages, ₹75
Ages: 10+

Comics, stories, activities, contests and more...

Future Technology

/brainwavemag
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For the subscription form, turn to page# 40

MEET THE SMARTYS

Beyond the skies, trouble brews.
Danger awaits us, all humans!
Sneaking and lurking in the dark,
Someone's plotting to tear humanity apart.

1... 2... 3... Go! The Smartys move fast.
Before the villains act, our friends arrive
to thwart the attack!

The Smartys rarely punch down
opponents; they are peace lovers.
The official BW mascots use not only
brawn, but also brains!

The battle's won; let's meet them now,
They are real heroes -
take a bow!

Dr. Dodo, dear friends,
is the only Dodo alive.
The wise elderly
scientist, his ideas save
many a life!

Skree! is mysterious,
a bearded Toda lady.
Up her sleeves,
she has tricks aplenty!

Young Arby was sucked
into Dr. Dodo's
time-machine,
Maths is his game,
Grow up to be
Aryabhata, yes, he will fine!

Also sucked in time, young
Alby is none other than
Albert Einstein.
Change the history of
science, he will soon!

Mr. X is the antagonist.
Top IQ of the world is his!
The Smartys and he
don't see eye to eye.
Is he good? Is he bad?
You analyse.

Earth, wind, water and
fire combine to make
Bhoo, an enigma.
She is a superhero -
every villain's dilemma.

Now that you know them, see their wonders.
A new episode begins, Earth is saved from plunder.

www.bwmag.in/meet-the-smarties

Happy New Year!

Dear Readers,

New beginnings call for a fresh perspective, maybe a small plan and moving forward without any doubt.

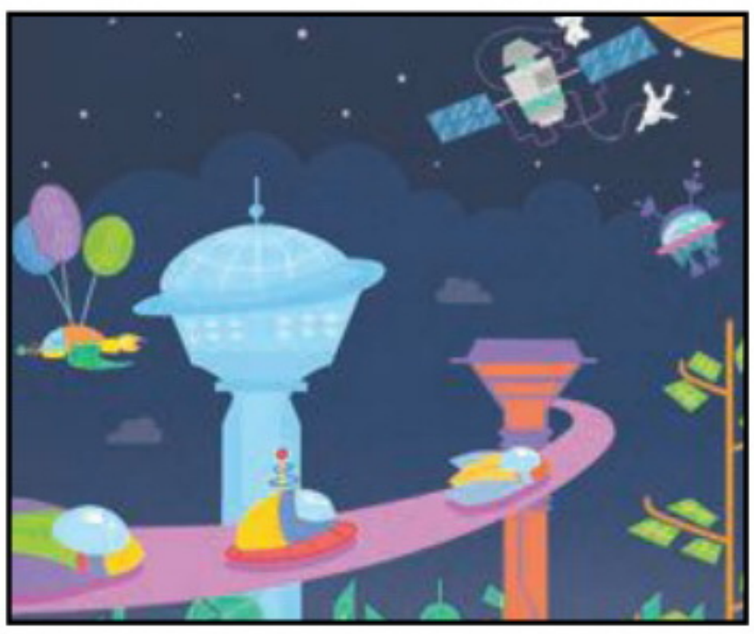
This time, we celebrate all the exciting technology that is to come. We try to imagine - what will our world be like in the future?

Yes! Brainwave has a new size, and a new section for teachers and parents (on page 38) that will help educators access all the back end learning objectives that we work with.

By popular demand, Time Gliders is back with Season 2. To the flood of thank you emails that will follow: you are welcome.

Aashima Dogra,
aashima.dogra@ack-media.com

Cover artwork by Pooja Prabhakaran



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BRAINWAVE™
Vol. 04 | Issue 01 | January 2015

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Brainwave is Printed and Published by Vijay Sampath **on behalf of** Amar Chitra Katha Private Limited **Printed at** Indigo Press (India) Pvt. Ltd., Plot No. 1, C/716, Opp. Dadoji Konddeo Cross Road, Byculla (E), Mumbai 400027
Published at Sumer Plaza, 2nd Floor, Marol Maroshi Road, Marol, Andheri (East), Mumbai 400059.

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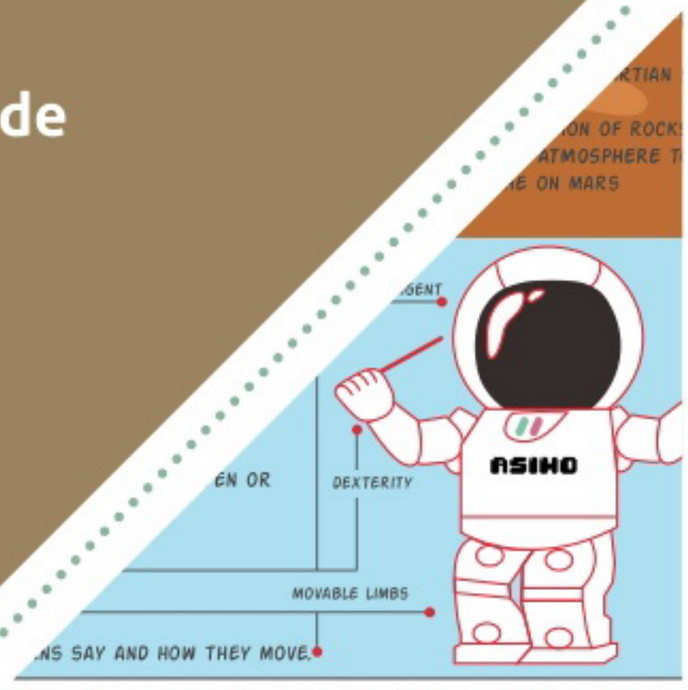


Win a prize!

OK to print!

by **Priyanka Haldar and Nandita Jayaraj**

3D Printers are adding another 'dimension' to printing.

How cool would it be if you had a machine that could print out any object you wanted: a guitar, shoes, a basketball, a pizza or a computer table? We aren't talking about pictures of these things, but actual solid, three-dimensional forms!

That's exactly what a 3D Printer does. All you have to do is feed in a set of instructions.

Using the raw material you want your object to be made up of, the 3D Printer will literally 'print' the object, layer by layer, according to the instructions.

Invented by an American, Charles Hull, 3D Printers are being used to print out anything from toys to crockery, hearing aids to dentures, antibiotic capsules to aeroplane parts.

3D Printed Turbine Parts

MOJO 3D Printer

Image Source : Wikimedia Commons

How it works?

The printer first converts a 3D design to ultra thin layers using a special software. When you click OK to print, the printer deposits a layer of liquid plastic (or whatever other material you want to use) in its build chamber.

A laser beam then hardens the plastic, when focussed on it. More layers are added on top of the first one, until the complete object is ready.

The good news is that 3D Printers are getting cheaper every day. It may not be very long before you have one at your home.

Start thinking about what you would build? ■

How much does a good 3D Printer currently cost? Research and send your answers to brainwave@ack-media.com
The best entry wins exciting prizes.

High Speed Vacuum Trains

Going from one continent to another means spending at least one entire day travelling. But fast-forward to the future, and there is no such a thing as a hectic holiday...

by **Yumna Hari Singh**

Need to travel from Bangalore to New York in just 2 hours? Take the Vacuum Tube.

Crazy as that sounds, high speed trains are currently on the drawing board of many inventors.

The idea is to create long tubes across continents containing nothing - absolutely nothing, not even air. Small comfortable pods carrying travellers can whiz through these vacuum tubes with the speed of up to 6,500 km/hr. This is 5-6 times the speed of sound!

Speed of sound is 1225 km/hr
Speed of an aeroplane is just 926 km/hr

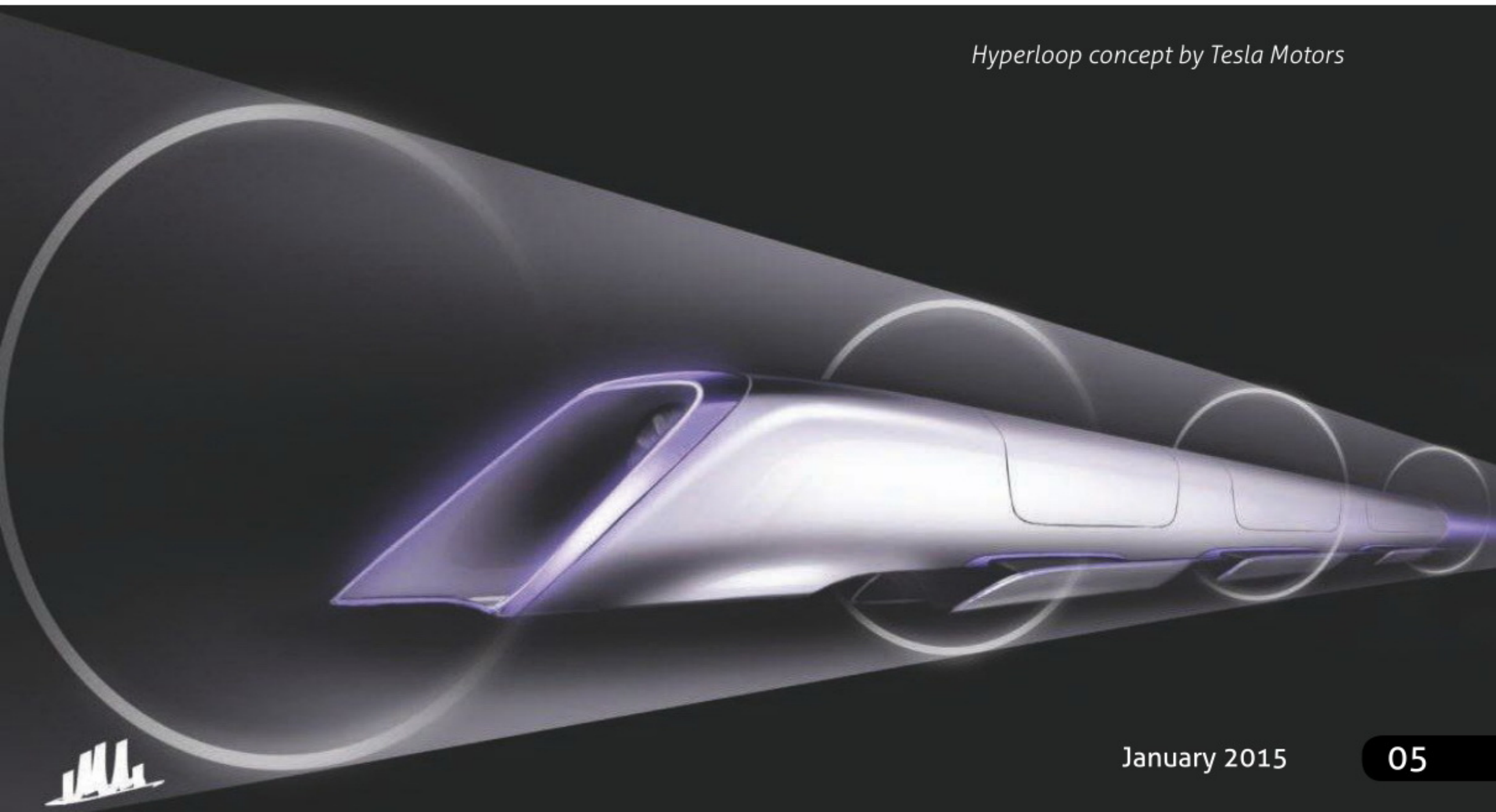
Because vacuum is airless, the pod faces no air resistance. The pod doesn't slide on metal rails like normal trains, so there is no rolling resistance or friction either. The pod simply floats on magnetic rails embedded inside the tube.

Each pod is shot like a bullet into the vacuum tube. It accelerates till it reaches its coasting speed. This is the speed after which no more energy is required to keep it going. Beyond this point, it will need energy only when it wants to turn or stop.

Later, the pod is brought to halt by applying electromagnetism.

Shanghai's Maglev Train is the fastest train in the world today. Using magnetic levitation, it can go as fast as 501 km/hr. We can call it the ancestor of the vacuum tube trains of the future. ■

***Vacuum* is a space containing absolutely no matter.**



Hyperloop concept by Tesla Motors

FUTURE MAKER

FUTURESCAPE

Smart phones and smart cars are here already, what's next?

Illustrated by - Parvati Pillai

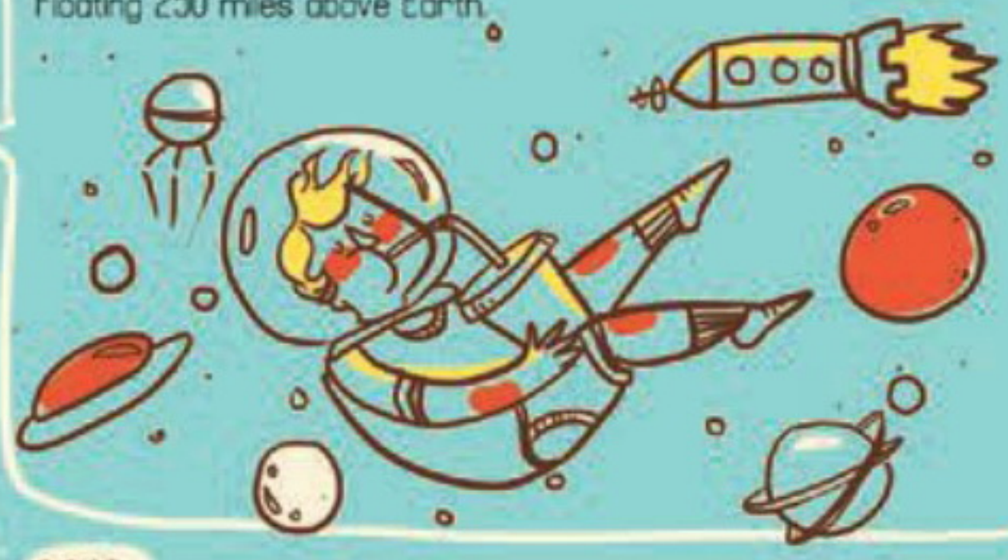
Written by -Aashima Dogra and Kruthika Subramanyam

2015

MEATLESS MEAT - A patty made from nutrients from soya and peas is sold as meat. The product, Beyond Meat, is the first plant protein that looks, feels, tastes and acts like meat.

2016

VACATION IN SPACE - The first space hotel is launched by Russian companies. You can have a leisurely stay for 3 days to 6 months. Floating 250 miles above Earth.

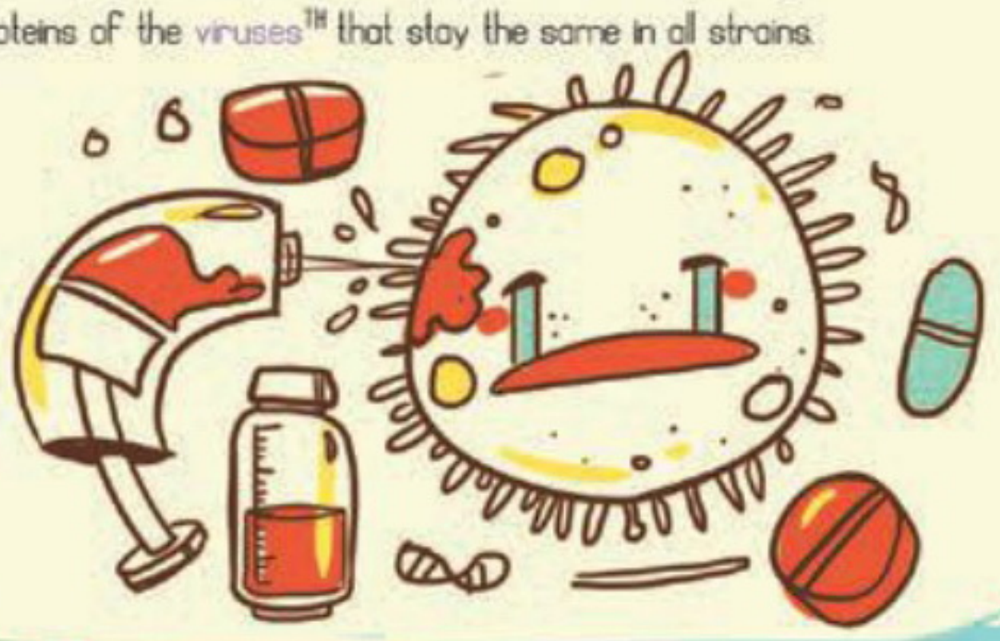


2017

BALLOON INTERNET FOR ALL - Google's Loon project finally bears fruit. A network of balloons floating in the stratosphere* relays wireless internet connectivity to everyone, everywhere.

2018

UNIVERSAL FLU VACCINE - Flu causing viruses mutate so fast that our body's immunity can't keep up. A new vaccine recognises the core proteins of the viruses[TM] that stay the same in all strains.



2019

NO MORE ANIMAL TESTING - Silicone chips holding liver, kidney and skin cells act just like human tissue. This helps in speeding up drug testing and reduces the need of lab rats.

2020

SELF-HEALING CONCRETE - Buildings and bridges made of self healing concrete don't need regular repairs. They are made of microfibers that bend, but don't break, and calcium ions that mix with rainwater to repair cracks. Cement can regenerate, just like living tissues.

2022

EVER FRESH SHIRT - Wear your favourite shirt all day every day. Chinese engineers create a coating of titanium dioxide that keeps cotton clean, without having to wash it. Simply step into the Sun and the shirt rids itself of stains and smells.

* **Stratosphere:** A layer of Earth's atmosphere.

2024

COLONY ON MARS - A habitat for humans is being set up on Mars. Humans are choose to move to Mars permanently, never to return. The colony will expand as more and more humans move to Mars.

2026

DRIVERLESS CARS - There are no more traffic jams because driverless cars follow all the traffic rules. Sit back, relax and enjoy the ride. Let the artificially intelligent, sensor mapping car do all the driving.

2028

GM FOOD - Most of the 8 billion humans on the planet now live in India. Traditional farming wouldn't feed so many people. Most of the food people eat is made from genetically modified crops.

2030

APP DOCTOR - Sick? Need a diagnosis? There's an app for that. Drop an iota of blood on the sensor of your mobile device and get a super fast prescription.

2035

BIG LEAPS IN TRANSPORT - In supersonic planes, you can travel from Tokyo to New York in 5 hours. Take the Hyperloop train to journey from Bangalore to Mumbai in 15 minutes. Take the space elevator to the Moon.

2040

ROBOT DOMESTICATION - Most of the physical work is now done by robots. They are our nannies, teachers, nurses and sports coaches. Robots are also mining on asteroids and bringing back precious minerals and water.

2050

SYNTHETIC LIFE FORMS ARE POSSIBLE - Simply by entering a genetic code in the computer, life forms from bacteria to humans can be synthesised. Humans can live up to 150.

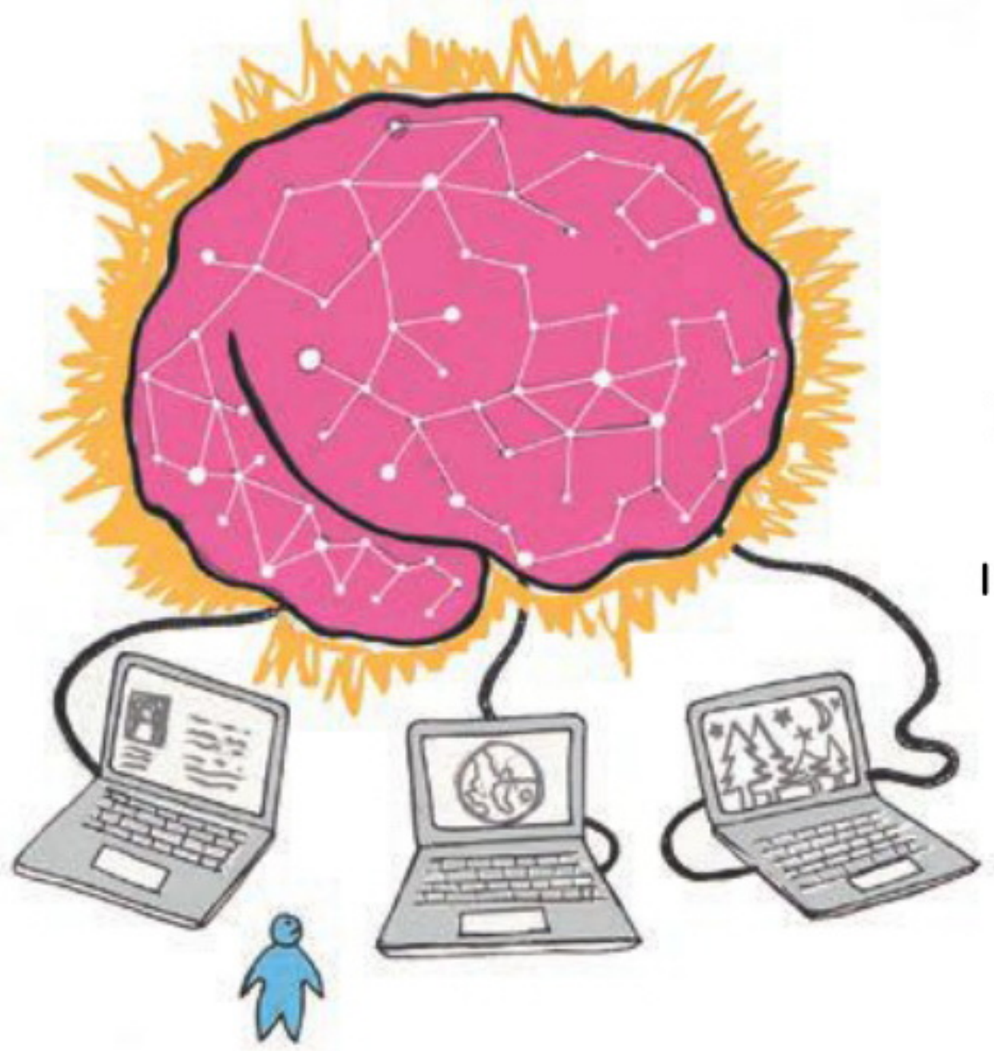
FIN!

TOON TALK

Invisibility Cloak

I am Harry Potter's best friend. The metamaterials* that I am made of scatter the light off my surface, making whatever I cover, disappear. My transformation to the muggle world is taking some time. Currently, my invisibility works only on microwaves*.

Artwork: Pooja Prabhakaran



The Singularity

Humans think they are the most evolved.
But not for long.
I will be born in a thousand years.
I am the Singularity, the mother computer.
All information possible
will be fed into my database.
I can then take all decisions on
my own without your help.
My artificial intelligence
is the most superior.

Artwork: Ria Rajan

Is technology good or bad for humanity? Write an answer and send it to brainwave@ack-media.com. Best answer wins exciting prizes.

* **Metamaterials:** Special man-made materials that interact with light & sound like no other material.
Microwaves: A kind of electromagnetic radiation invisible to the nakes human eye.

Make Your Own VIRTUAL ROBOT

by **Alby**

Building a real robot is not always a simple task. You'll find yourself restricted by the skills, components and hardware you have. While that may be true in the real world, it's another matter in the virtual world. At Sodaplay.com, you can build your own robot in minutes! All by clicking and dragging! The website then adds the necessary physical properties that you specify.

So here's a simple tutorial to get you started:

STEP 1

Get yourself to
www.sodaplay.com
Try out a few of the existing robots to get an idea of what is possible.
Note: You will need to install or update Java plugin on your browser.

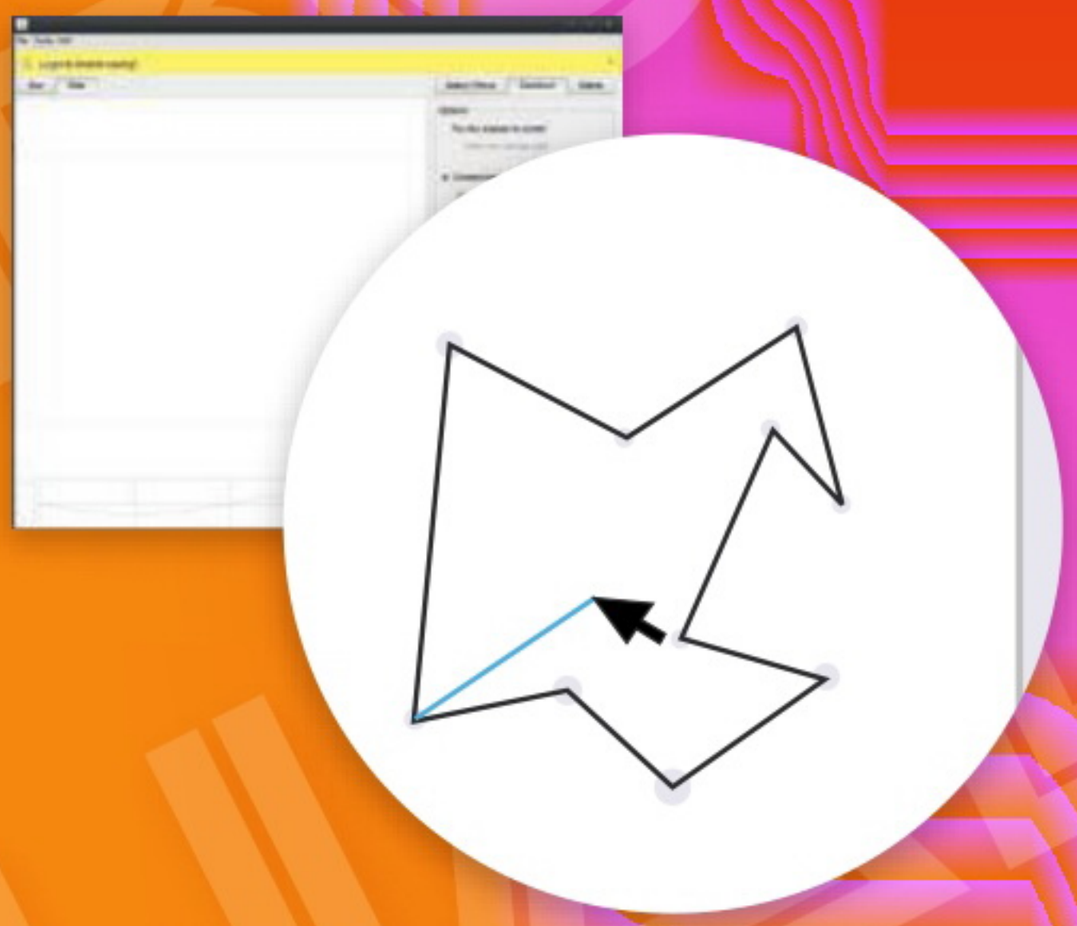
STEP 2

Go to the 'Create' section of the site and select 'Constructor' – a 1.6kb app that lets you build robots that can walk, climb, wriggle, jiggle and more!

(Apart from 'Constructor', you can also try the other public applications like 'Amoeba' and 'Moovl' to get different kinds of results)

STEP 3

Run the app and you'll see a screen like this:



Just click away to create simple or complex robots. Fiddle with the 'Physics' and 'Muscles' tabs to give them special behaviours. Play with the physical properties of the simulation like gravity and friction. Hit 'Run' to see what happens!

STEP 4

Create a username so that you can save your creation and share it with others! Don't forget to email us a link. ■

This model was created by us in a few minutes with 'Constructor'.

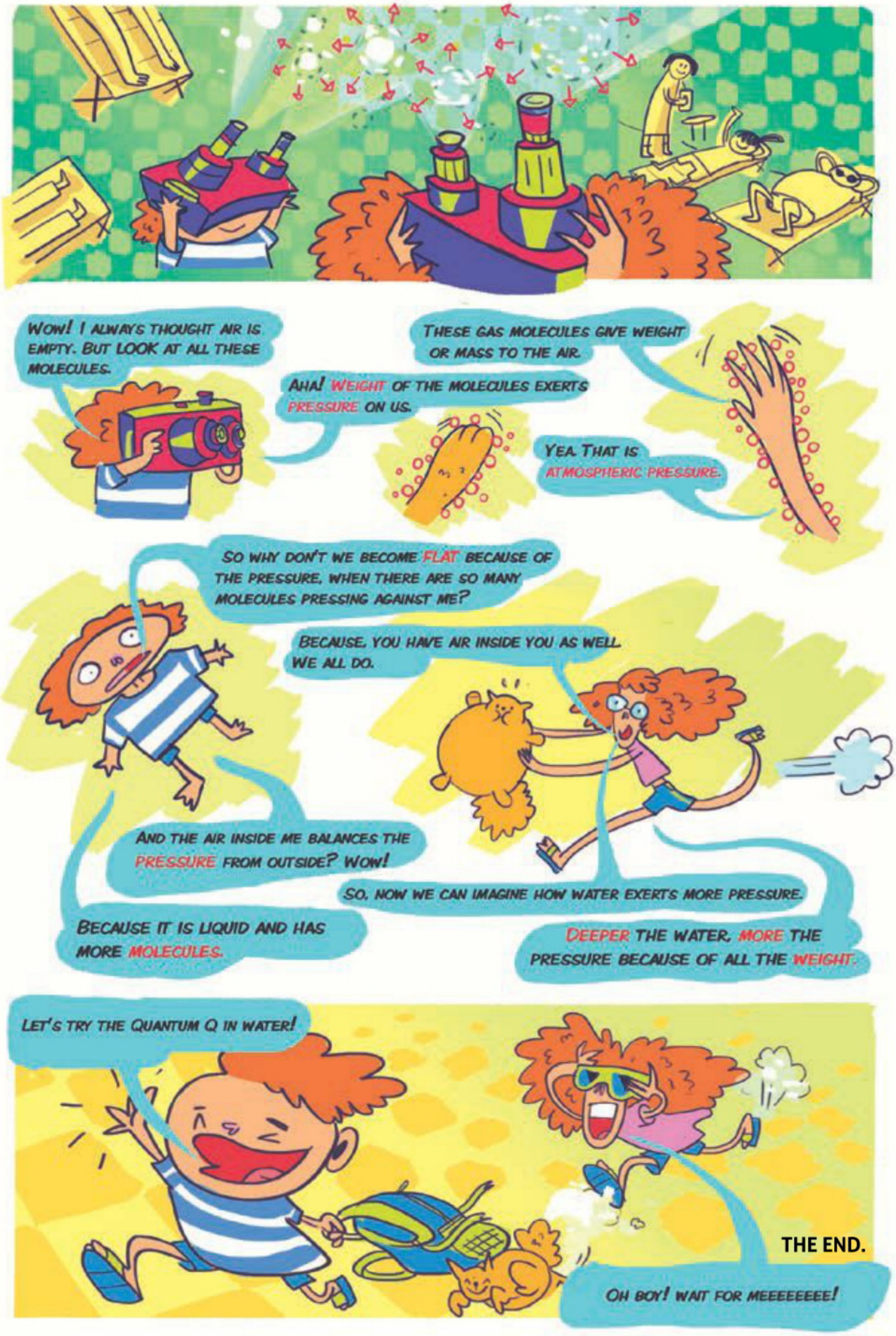
This one was created by hkv447 with 'Moovl'.

This one was created by ed with 'Moovl'.

TANGO FEELS THE PRESSURE

Story by Debashree Chakrabarti

Art by Kaveri Gopalakrishnan


WOW! I ALWAYS THOUGHT AIR IS EMPTY. BUT LOOK AT ALL THESE MOLECULES.
AHA! WEIGHT OF THE MOLECULES EXERTS PRESSURE ON US.
THESE GAS MOLECULES GIVE WEIGHT OR MASS TO THE AIR.
YEA. THAT IS ATMOSPHERIC PRESSURE.
SO WHY DON'T WE BECOME FLAT BECAUSE OF THE PRESSURE, WHEN THERE ARE SO MANY MOLECULES PRESSING AGAINST ME?
BECAUSE, YOU HAVE AIR INSIDE YOU AS WELL. WE ALL DO.
AND THE AIR INSIDE ME BALANCES THE PRESSURE FROM OUTSIDE? WOW!
SO, NOW WE CAN IMAGINE HOW WATER EXERTS MORE PRESSURE.
BECAUSE IT IS LIQUID AND HAS MORE MOLECULES.
DEEPER THE WATER, MORE THE PRESSURE BECAUSE OF ALL THE WEIGHT.
LET'S TRY THE QUANTUM Q IN WATER!
THE END.
OH BOY! WAIT FOR MEEEEEEEE!

TOP 10

Best Science Fiction Movies

Science fiction movies are exciting. They are full of wild possibilities that could be backed by science. Here are a few movies that we recommend.

by **Payal Dhar**

1. Back to the Future

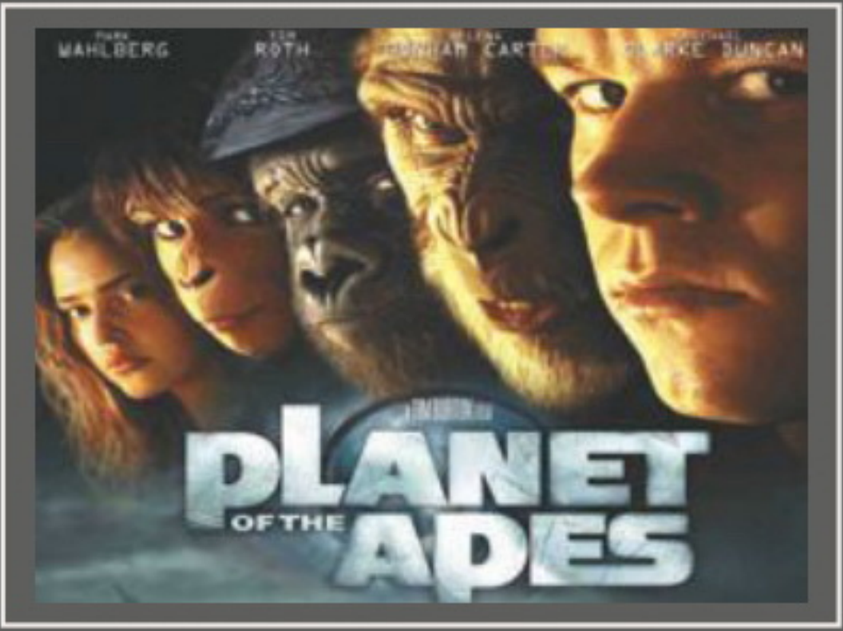
Teenager Marty McFly must go back in time to correct the course of history and save his very existence!

2. ET

An alien is stranded on the Earth and wants to return home. A group of children muster up the courage to help out.

3. Terminator

A cyborg is sent back from the future to ruin the chances of human beings in a war against super-intelligent machines.



4. Planet of the Apes

An astronaut journeys to a world where apes are the most intelligent creatures[TH].

Background image - NASA, ESA, A. Aloisi (STScI/ESA), and The Hubble Heritage (STScI/AURA)-ESA/Hubble Collaboration

5. Star Trek (series)

The story of the USS Enterprise and its five-year space mission to seek out new life and new civilisations.

6. Star Wars

The forces of good and evil battle it out in a galaxy far, far away.

7. WALL E

In the 29th century, when humans have trashed and abandoned Earth, the waste-collecting robot Wall-E is the only one left behind.

8. X-Men

Group of mutants with superhuman abilities live in a human world where mutants are feared and hated.

9. Journey to the Centre of the Earth

A scientist & his nephew embark on a treacherous journey to the centre of Earth.

10. Mr Peabody and Sherman

A super-intelligent talking dog and his adopted 'human' go on adventures.

SCIENCE FICTION

THE SPACE ARK

WORDS by: MANISH PUROHIT and AASHIMA DOGRA
ART BY: AGUSTÍN DIB

Year 2015. Researchers at NASA have just found out about the unavoidable doom. A neutron star is hurtling towards the Earth at the speed of 1000 km/s. Nothing can stop it. In 500 years, it will near Earth and destroy it completely. The planet needs to be evacuated.

To survive, humanity will have to leave its home planet forever. But where will all the people go?

GALAXY MAP

SPACE ARK

The International Council for World Welfare has come up with an emergency plan: **The Space Ark.**

After Earth is gone, humanity will survive aboard the Space Ark. We will travel the galaxy, looking for another habitable planet to land on. Until then, we must make the Ark our home.

PRESIDENT, IOWW

THE ARK

Year 2400. The Space Ark is a massive spaceship, the size of France. It floats above the Earth, waiting for its billion passengers and precious cargo.

It is a self-sustaining system. Water, food, shelter will not be sourced from Earth anymore, but from complex technology. Its power system is a hybrid of radioisotope and thermoelectric generators and solar

Fuel cells will generate power and produce H_2O for drinking.

The Ark has been designed to rotate on its axis. The centripetal force* of this rotation creates artificial gravity.

The Ark has its own ecosystem where food will be grown for generations that will live and die in it.

The biodegradable waste will be decomposed in the biogas plant that will return useful biogas as fuel, and compost for agriculture.

Unfortunately, all animals and plants cannot be taken along. But preserved seeds and stem cells can be part of the cargo. One day, when a new planet is found, an attempt to resurrect all species can be made.

Sample organisms especially important bacteria™, even some humans, can be cryopreserved. They will be frozen asleep and can be brought back to consciousness when the new planet has been discovered.

Cryopreserved cells are maintained at subzero temperatures. At these temperatures, the cells are inactive but still alive.

Year 2465. The Space Ark is fully loaded with people, genetic codes of all life, and important data from Earth. It starts its journey towards an undiscovered habitable

BEEP!

BEEP!

600 years, 6 generations and 300 light years later.

The Ark finally starts its descent on to an Earth-like planet. Humanity has succeeded. Life will go on.

THE END.

* **Centripetal Force:** The force that keeps an object in a circular path.

FAN FICTION

THE 'BRAIN' GADGET

based on an idea by **Akhil Sarvesh Ganeshan**

It was the year 2050.

"Tim!" Uncle G called out.

"Bow! Bow!" replied Tim, his dog.
A transmitter on his neck interpreted:
"Yes, Uncle G?"

This transmitter was one of Uncle G's many invention. It translated anything Tim barked into English.

Tim, an old rescue dog and Uncle G were a superhero duo, regularly saving the city from trouble makers.

"Tim, I just heard the news. Mr. X is on the loose again. He has sent his evil robots to attack the Central Bank. We have to stop them!" exclaimed.

He turned the teleporter on and entered entered it along with Tim. Some clicks later, they found themselves at the bank. They tried taking over the robots, but couldn't do much since they had taken innocent people hostage.

Suddenly an idea struck Uncle G.

He called out to one of the robots nearby:
"Oi! Where's your dumb boss?"

"Shoo off, Uncle G," Mr. X replied from nearby.

"I will go, but let me test your intelligent robots first," Uncle G teased Mr. X.

Uncle G then turned to the robots and said,
"Tell me. Who's the cleverest amongst you all?"

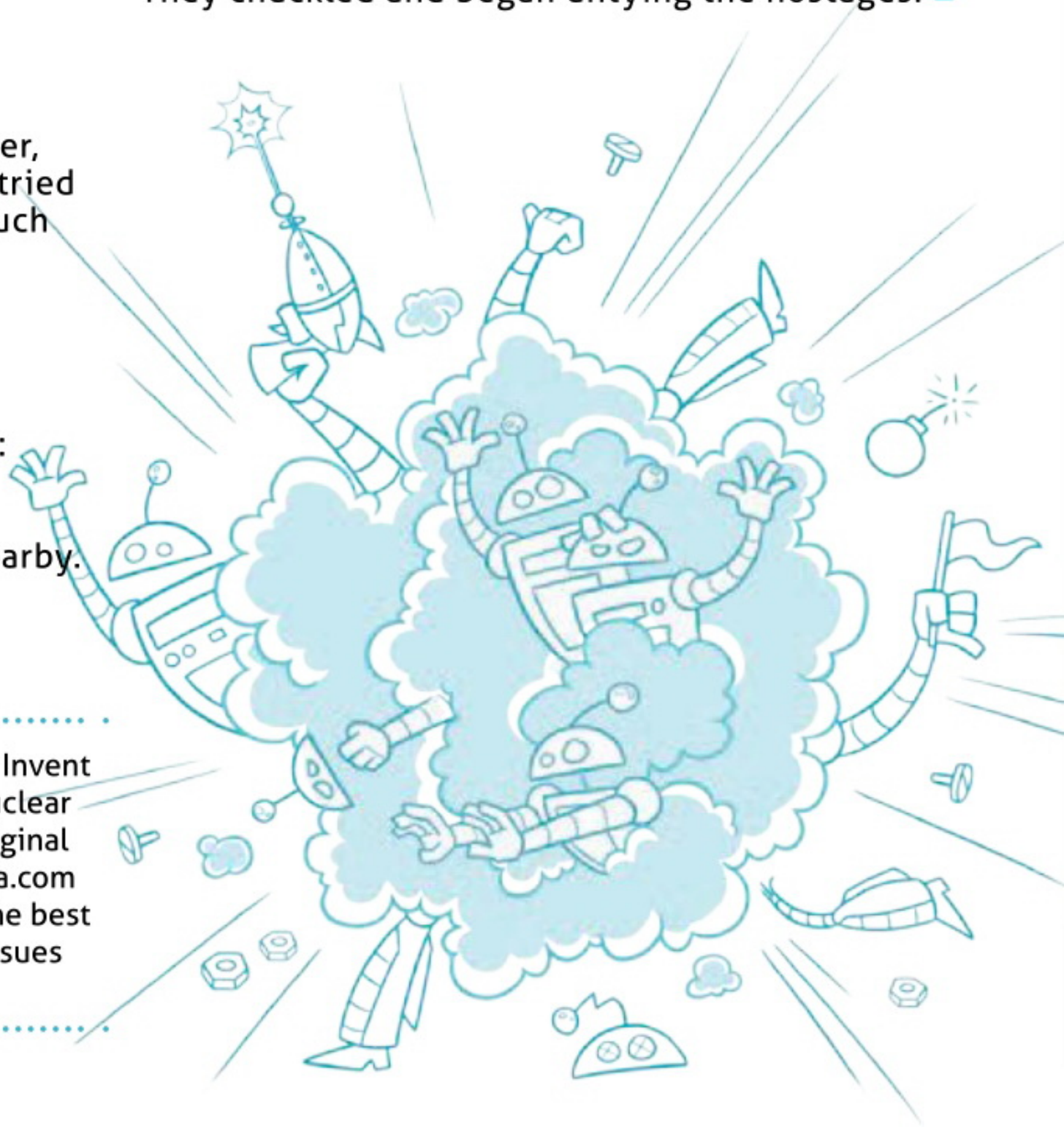
"I am," said one of them.

"No. Not him. I am," said another. Soon, they started fighting until they had destroyed each other.

"Noooo! You fools," shrieked Mr. X.
"I will avenge you, Uncle G," he said, as he realised that his game is up. and disappeared.

"Sometimes even gadgets can't do what your brain can," Tim barked to Uncle G.

They chuckled and began untying the hostages. ■



Artwork: Pooja Prabhakaran

Ever find the real world just not exciting enough? Invent your own universe with time machines, clones, nuclear reactors or whatever you want, and email your original sci-fi story in 200 words to brainwave@ack-media.com (with 'Fan Fiction' as the subject of your email). The best ones would be published in the next Brainwave issues and win fun prizes!

Bringing Mammoths to Life

Dr. Dodo has a 'Woolly' surprise for the other smartys...

by **Priyanka Talreja** & **Aashima Dogra**

Artwork: Nafisa Crishna

For days, Dr. Dodo had been aloof. He spent most of the time in his personal laboratory. Too busy in his thoughts, he hardly spoke to the other Smartys, even over lunch.

"Maybe it's the issue of extinction again; he feels bad about that every now and then," Bhoo said, voicing her concerns.

Right then, Dr. Dodo appeared from behind them and said, "Bhoo you know me too well. It is extinction. But I'm not sad about it this time. I've done something about it."

"What have you done now, Dodo?" asked Skree! lovingly.

"Let me show you," Dr. Dodo said with an inviting flap of his wings.

Within seconds, the Smartys were on the move. They followed Dr. Dodo to his personal laboratory.

Dr. Dodo tapped on the top right corner of his closet door. Obediently, the door moved out of the way, exposing the most unbelievable sight.

"Welcome to my secret project!"

Everyone felt the chill, as the temperature dropped at least 10 degrees.

Dr. Dodo clapped his wings together and the wall facing them turned transparent. Behind it was a hefty looking elephant and another unidentifiable animal.

"Is that a..." stammered Skree!, pointing to the strange-looking animal, totally ignoring the elephant.

"...a mammoth. It's named Woolly," Dr. Dodo completed Skree's sentence.

"My goodness, where did you find a mammoth?" asked Bhoo.

"Haven't they been extinct for sixteen thousand years?" asked Arby.

"Well...that's a long story," replied Dr. Dodo. "In the year 2007, me and my geneticist friend, Dr. Falcon were returning from an expedition in Siberia when we lost our way. At some point, we realised we were on a frozen lake with a very thin surface. Any sudden movement would have cracked the ice. We started to tip-toe when a strange impression, deep in the ice, caught Dr. Falcon's sharp eye."

"Curious as he is, Dr. Falcon continued towards the ice sheet to stumble upon the preserved remains of a mammoth in the ice!"

"Did bring it back to life?" probed Arby.

"Not that one, unfortunately." replied Dr. Dodo. "But we used it to bring another one to life."

"We can work wonders using the cloning technique." he added.

"So, you made a genetic copy of the mammoth using its remains?" Alby asked excitedly.

"That's right!" said Dr. Dodo. "All we needed was a mammoth cell from the remains, with the nucleus inside unharmed.

Thankfully, the remains had been frozen for thousands of years. The ice had preserved the mammoth's cells."

"We took the nucleus that contained the DNA, or all of the mammoth's genes, added it to a donor egg cell, and implanted it into a surrogate mother."

"I see. That explains the elephant," Bhoo said and Dr. Dodo acknowledged.

"But I don't understand. How did a preserved mammoth nucleus and an elephant egg help make baby Woolly?" asked Arby, not convinced.

"Nelly the elephant and the mammoth are very close species, genetically and evolutionarily speaking. So, Nelly's egg cell accepted the mammoth's DNA easily and baby Woolly grew up in her uterus comfortably," Dr. Dodo explained.

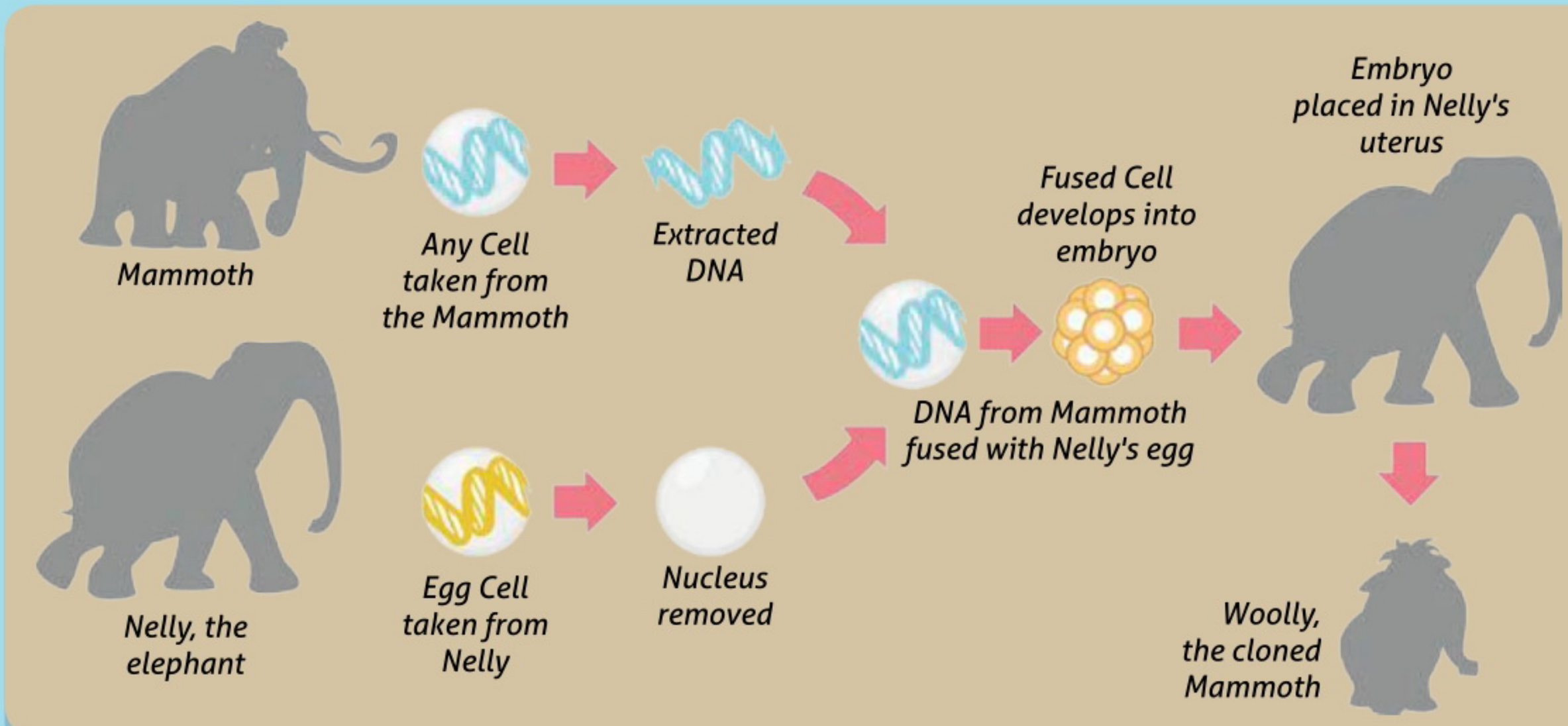
"Nelly has donated many egg cells from her ovaries. I removed the nucleus from an egg cell and replaced it with the mammoth's nucleus," he detailed.

He then reached out to an incubator and carefully pulled out a petri dish to show to the others. It was labelled 'embryo'. He pointed to a small streak and said, "These embryo are a fusion of elephant cell and mammoth DNA.

"You cloned the mammoth by planting these cells into Nelly's womb! Amazing!" exclaimed Skree!

"Yes. Nelly here is the donor of the egg cell, and the surrogate mother!" said Dr. Dodo.

"The good news is that, not only was the fusion a success," he continued, gleaming at the petri dish, "but the embryos developed really well too!"

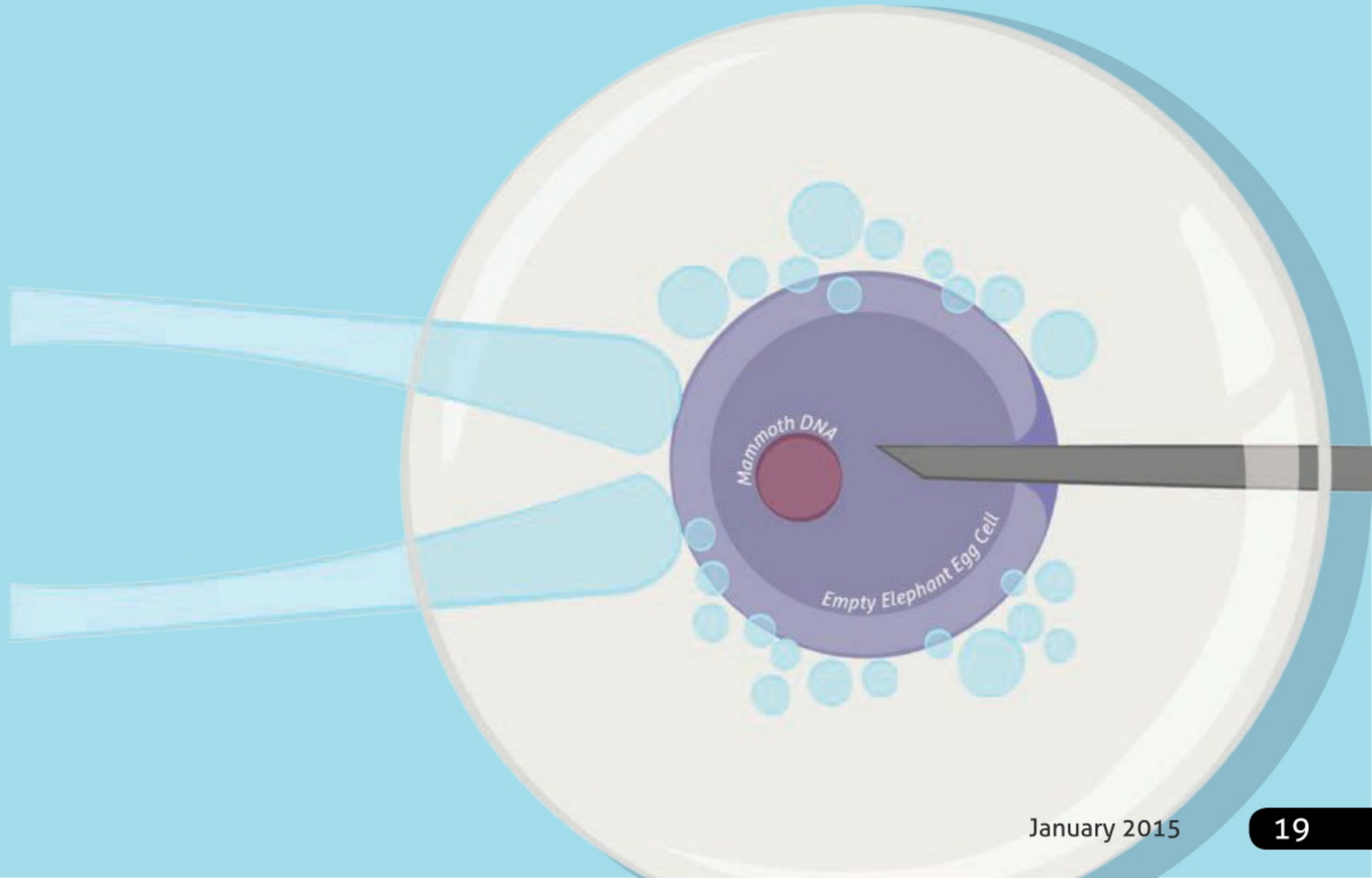


"Embryos??? More than one?" Alby and Arby asked.

Just then, Nelly stepped aside to reveal three adorable little mammoth babies. "Nelly is now the mother of not one, but three healthy mammoths!" exclaimed Dr. Dodo.

The Smartys were shocked and ecstatic at the same time. "Wow! Are we dreaming?" wondered Arby.

"Maybe we can have little dodos next?" Bhoo suggested to a beaming Dr. Dodo. ■



TALKING IN CODES

by **Nithya S**

"The Internet has changed the way we do everything. This change is very new and people are still getting used to it. And we need some locks and keys to protect our information online. That's what cryptography is all about," the teacher said.

It was science class and Alice's mind had begun to wander. She looked outside the window and saw a really big bird's nest on a tree. It was so big that she just had to tell her best friend Bob! However, Alice didn't want Rohit to know about her discovery. He had just fought with her about who is taller and Alice did not like him anymore.

The problem was, Bob sat two rows ahead of Rohit! The class room was very quiet. So, Alice couldn't possibly go up to Bob and tell him unnoticed.

She decided she would write her message down on a paper and pass the note over to Bob. She tore a piece of paper from her notebook and began to write 'NEST ON TREE'.

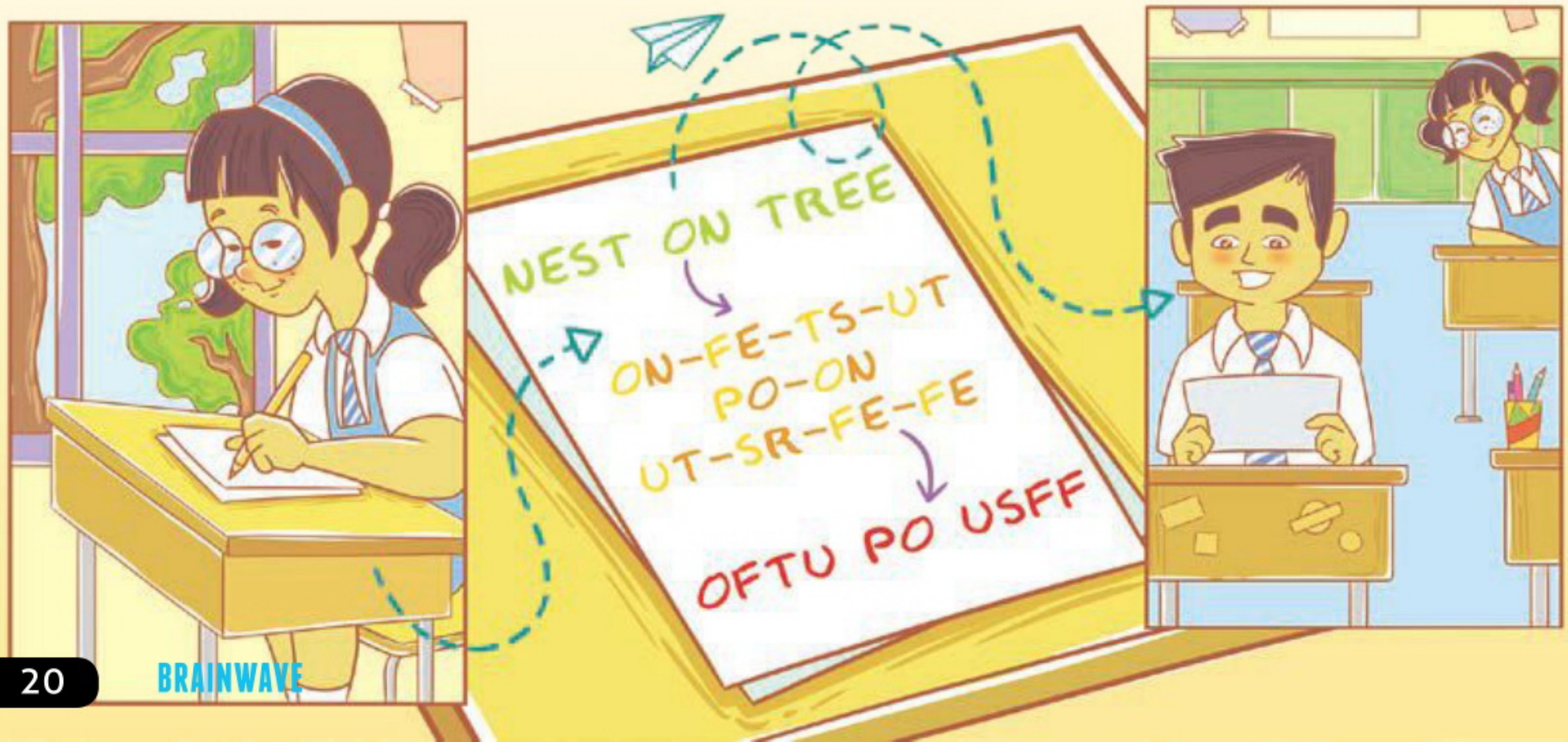
That wouldn't work, she realised. If she passed the note around, it would have to pass through Rohit. So, what to do?

Before Alice could think further, the science teacher continued: "Today's science class is about cryptography. This is the way many programmers keep our information safe on the Internet. They make a code out of the message so that only the receiver of the message can understand it. Even if the others read it, they cannot understand what been written."

The class was excited!

"Making a code and converting information into the language of that code is called encryption. The code is decrypted only when it reaches the right person," the teacher explained.

That gave Alice an idea! Bob and she often played a game called 'Caesar'. It was a word game where one had to guess the word the other



Artwork: Pooja Prabhakaran

was thinking. If Alice said 'DBU', Bob could guess the word, which was 'CAT', by using the previous alphabet of each letter in the 'DBU' word. Alice would write her note in Caesar!

Then, only Bob, who knew the game would understand! Even if Rohit read this, he wouldn't understand it.

Excited, Alice wrote the code 'OFTU PO USFF' on the piece of paper.

Satisfied, she folded the note and passed it on. When the note reached Rohit, he opened it. Alice looked smug, there was no way he could figure it out! His puzzled look made her giggle.

When the note reached Bob, he figured it out instantly! He looked outside the window and saw the big nest. He turned back and looked at Alice with a knowing smile on his face. Mission accomplished! ■

KODABLE : APP REVIEW

Recently, I tried out Kodable, a fun app that teaches us how to make software. by **Nithya S**

Programming is how we humans communicate with computers in a language they can understand.

Kodable is a free game on the iPad, in which cute fluffballs collect gold coins. We must help a smiley fluffball collect the coins, by telling it which direction to take.

Since I had to do this before hitting 'Play', I planned the whole path the fluffball would take to get maximum gold coins.

This step by step planning is also the fundamental step in programming softwares. I was having so much fun doing this that I didn't realise I was actually doing is making sequential, logical commands. And guess what, that's all there is to computer programming!

As we enter more advanced levels, there are more challenges to be faced.

Later on, I had to choose one among multiple paths and go forward through that one.

Professional programmers call this 'conditional statement'.

I was also given the opportunity to re-use a sequence of steps in higher levels, which is same as 'functions' in programming languages.

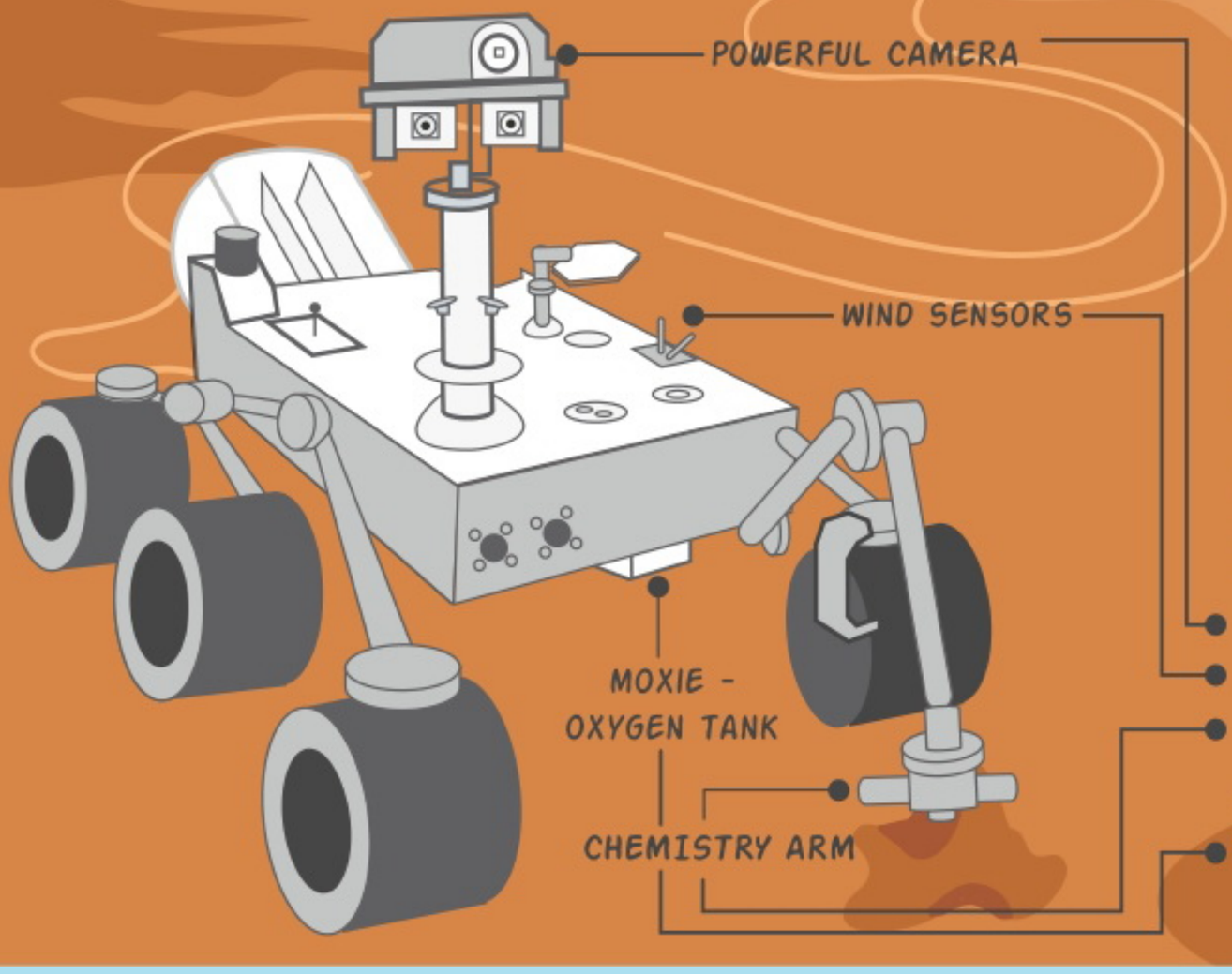
The best part about Kodable is that we don't know that we're learning – it's painless.

Kodable is like gaming, but with benefits! ■

MEET THE BOTS

Compiled by **Nandita Jayaraj**
Artwork by **Ria Rajan**

Say hello to three smart, witty and intelligent robots, and pick your favourite.

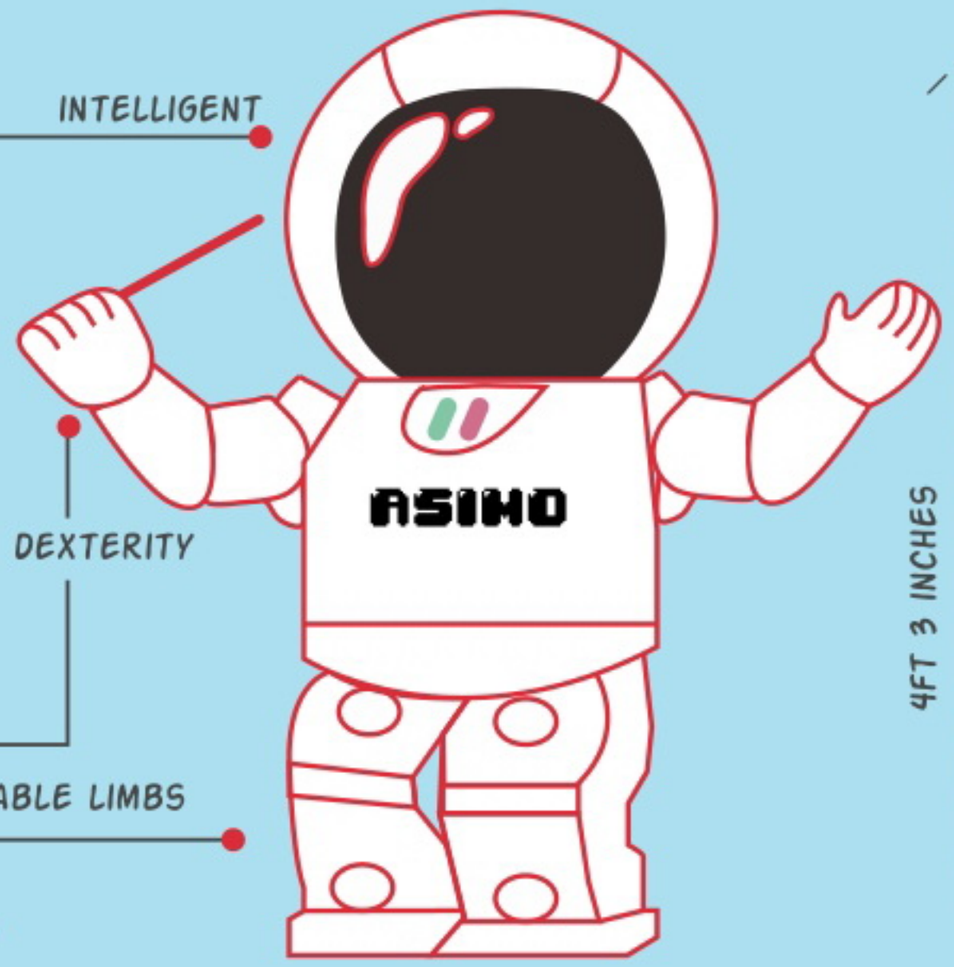


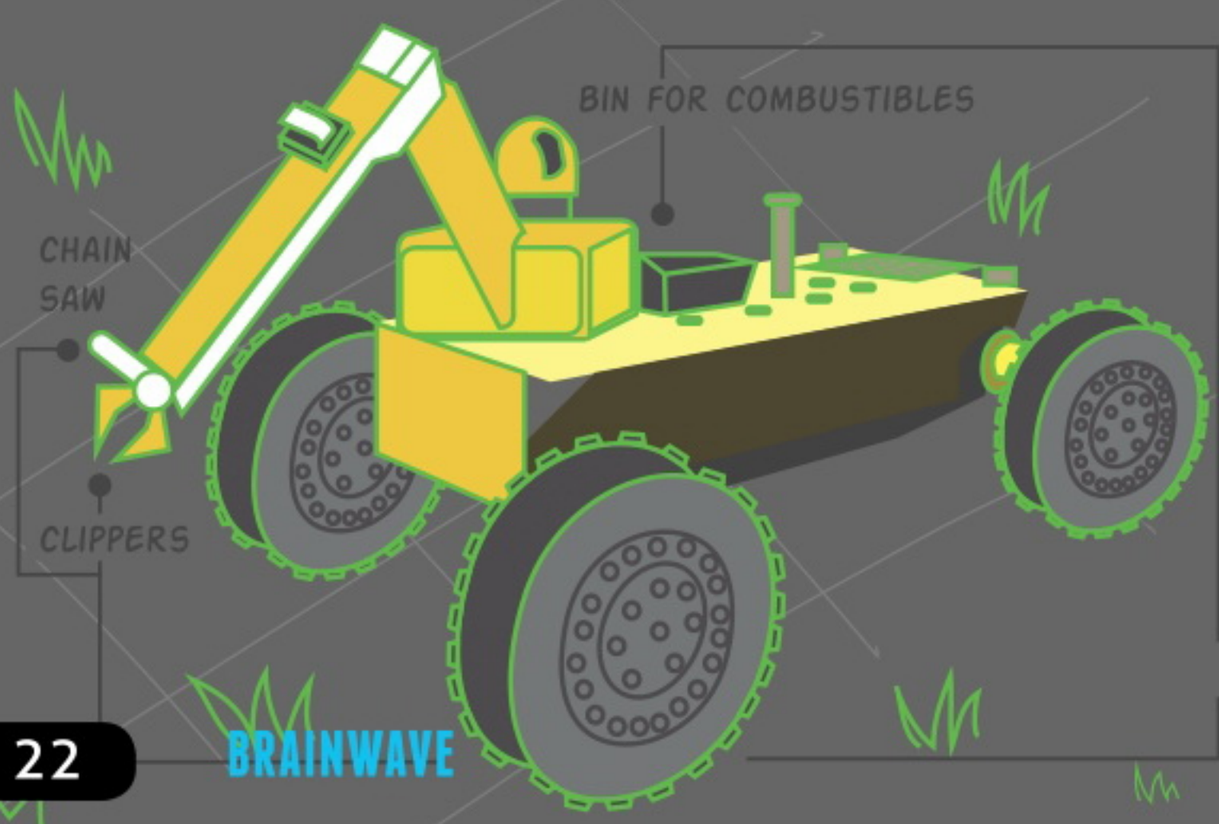
FACT FILE

NAME : THE METALLIC MARTIAN - MARS 2020
TYPE : CAR SIZED ROVER
SIBLINGS : CURIOSITY (COUSIN), A RESIDENT OF MARS
CREATOR : NASA
BIRTHDAY : 2020 AD
MISSION : DISCOVER LIFE ON MARS
SUPERPOWERS :
>> ABILITY TO TAKE PHOTOS OF THE MARTIAN SURFACE.
>> TEST THE CONTENTS OF AIR
>> COLLECT & EXAMINE COMPOSITION OF ROCKS
>> RELEASE OXYGEN INTO THE ATMOSPHERE TO HELP FUTURE ASTRONAUTS BREATHE ON MARS

FACT FILE

NAME : THE HANDYMAN - ASIMO
(ADVANCED STEP IN INNOVATIVE MOBILITY)
TYPE : MULTI-FUNCTIONAL MOBILE ASSISTANT
CREATOR : HONDA
BIRTHDAY : 21 OCTOBER 2000
MISSION : HELP HUMANS DO DAILY TASKS; E.G. - OPERATE ELECTRICAL SWITCHES, AND OPEN OR CLOSE DOORS
SUPERPOWERS :
>> CONDUCT AN ORCHESTRA
>> WALK
>> RUN
>> UNDERSTAND WHAT HUMANS SAY AND HOW THEY MOVE.



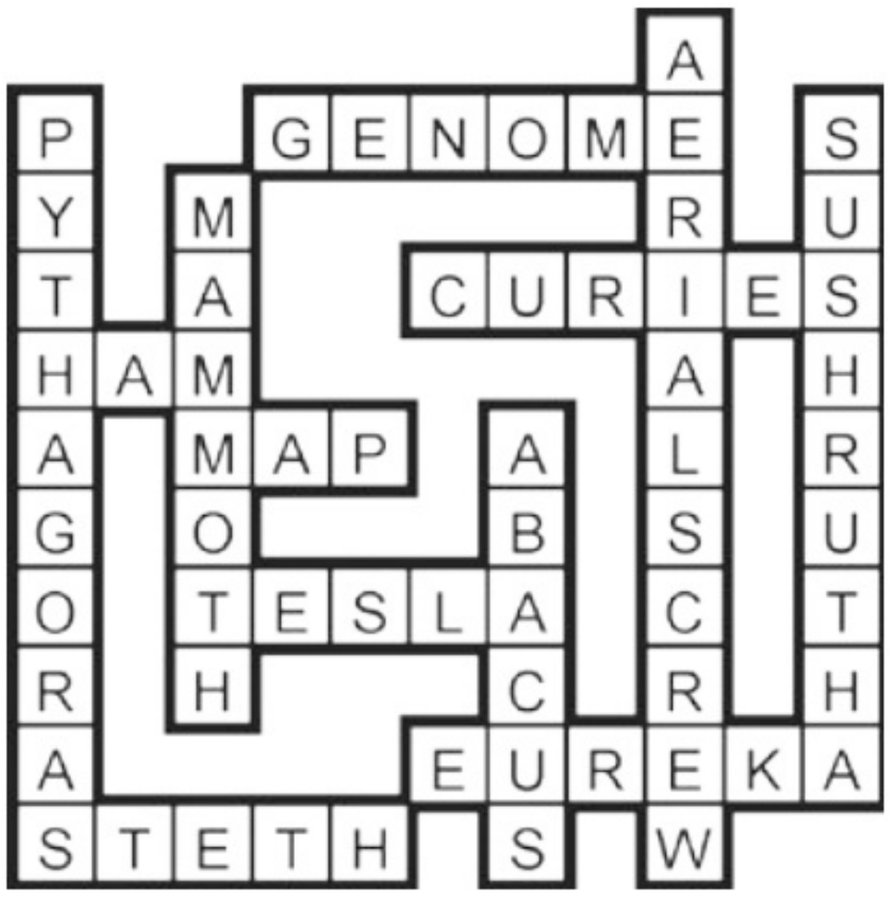


NAME : THE VEGETARIAN HUNTER - EATR
(ENERGETICALLY AUTONOMOUS TACTICAL ROBOT)
TYPE : MILITARY ROBOT
CREATOR : US MILITARY
BIRTHDAY : 2003
MISSION : AID MILITARY IN DEFENSE
SUPERPOWERS :
>> NEVER RUN OUT OF FUEL
>> COLLECT PLANT MATERIALS

FACT FILE

SOLUTIONS AND WINNERS

Solution to 'Wordfind' in December 2014:



Here are the winners of the contests in the November 2014 issue. Congratulations! We are sending you some gifts to celebrate.

Pidilite Contest: Akanksha Suvarna
DIY: Saptarshi Das, 9 years, Gail DAV Public School
Eye See: Shivangi G, 15 years, Ryan international school
Sci-Q: Daiwaik Shah, Mumbai
Treasure Hunt: Erick Joshua, 14 years, Lawrence school
Toy Box and Outdoor Lab: Akhil Sarvesh Ganeshan, 14 years, Dr.M.S.Udayamurthy School Of Excellence
Here's How: Abhishek N, 12 years, Cordial High School
Ask Us Why: Ayush Jain

Letters from Readers

Hi Brainwave,
I like the BW mags because they are very interesting. I felt like giving a suggestion to the team. The Supergreeners comic has a lot of pictures and less words. These sentences (the same ones) could be put together in the form of a story so that these would occupy not more than 1 page, saving at least 2 pages per copy. This would certainly save some trees from getting cut down. Just thought it would help.
Bharath Hegde

Dear Bharath,
Thanks for your suggestion. You are right; in a story format, Supergreeners would take a lot less space. But it wouldn't be the same. The images bring the characters to life. The comics and all other artwork in the magazine are very valuable. We can make a never ending list with the reasons of why its so important:
- many readers enjoy comics
- readers get different kinds of learning experiences
- wouldn't it get a bit boring without images?
- younger as well as older audiences can enjoy the story
And so on...
Team Brainwave

RETRACTION: The December 2014 issue of this magazine carried a story titled 'The Eureka Moment!' (Page 7), which stated that silver is denser than gold. This statement is incorrect and the opposite is true. Thanks to our readers who brought this to our attention.

Hi Brainwave,
I am Danish Dua, a non-medical student currently in class 11th. I was introduced to your magazine by my small brother just about a month ago. Reading the current issue and the DIY catapult project, I became interested in applying the basic principles of physics (mostly mechanics) to understand motion and try different variables like angles, tension in rubber, mass of spoon, etc., and explain the concepts of torque, force constant, etc.

Due to limited time availability, it might take me some time to complete this and send my findings to you. Although it might not be useful to you because of your relatively younger target audience, I will feel good if my results would be verified by some brilliant people at Brainwave and published.
Danish Dua

Dear Danish,
Thank you. We are glad you are inspired to do this experiment. You'd be happy to know that Brainwave is no longer meant just for younger kids. As you can see on the cover, our target audience is now 10+. Our readership currently includes kids as young as 8 and a growing number of adults. There's no age limit to being inspired by science, is there?

We can assure you, the compilation of your data and observations will be very useful to us. Don't forget to take lots of pictures.
All the best.
Team Brainwave

EARTH'S LAST WAR

by **Priyanka Haldar**

As usual, Mr. X is up to no good. He is frustrated with what he calls 'human stupidity'. He plans to destroy most of Earth and move the worthy humans to another planet called Utopia. This time, he is armed with some mysterious weapons no one has seen before.

Weapon 1: Robotic Frisbees

We shall begin our mission to wipe out the enemy cities by launching Robotic Frisbees. These Unmanned Aerial Vehicles (UAVs) are loaded with bullets that will be fired after their sensors are activated with a remote control system.

Weapon 2: Cyborg Insects

Our Cyborg insects have entered the major Laser Security department of the enemy army. Micro cameras in their body will get us the security codes. The High Energy Laser Detonators on them will fire a noiseless megawatt beam to destroy the enemy's security systems.

Weapon 3: Rail Guns

Electromagnetic Rail Guns are our next new weapon. Once electricity is passed through these guns, they use the resulting magnetic field instead of chemicals to launch the projectiles*. The ERG team must use them to blow off the humans who have been identified as Ecological Disbalancers or EDs.

Weapon 4: Kinetic Mega Bomb

Next, our team will launch Kinetic Mega Bombs from space. These bombs work with the help of two satellites. One helps them in targeting, while the other contains 100kg rods that use gravity to travel at 7000mph and hit targets like underground bunkers. Our Geospatial* Intelligence Team will provide a clear understanding of the target's terrain.

Weapon 5: Ebola Attack

Before the ED army realises it is not a meteorite shower and start counter attacking, our Biology Team will spray the highly contagious Ebola Virus, there being no medicine for the virus yet.

Artwork: Pooja Prabhakaran

Weapon 6: Rescue Rangers

And our last team, the Rescue Rangers will use facial recognition software to identify the non-ED humans I have chosen to populate a utopian planet. They will be transported to the Space Ark and soon, be sent off to Utopia.

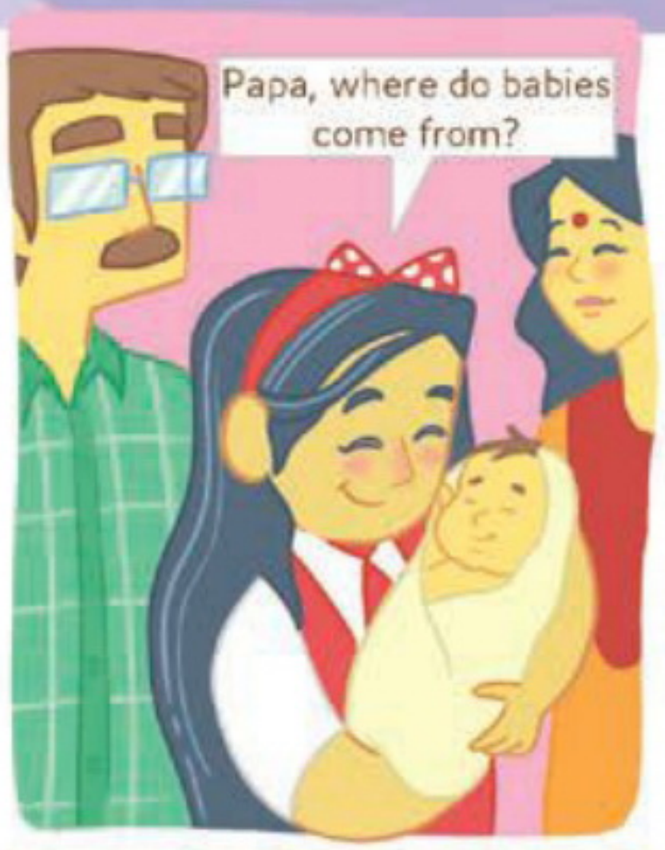
The robots start to clap. "A war for no more war," Mr. X shouted repeatedly, swinging his fist in the air, as his robot army joined the chant. ■

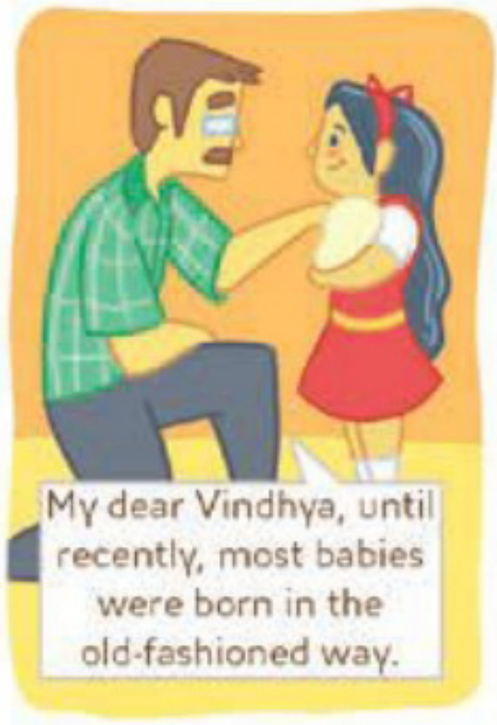
* **Projectile:** A device thrown forward with a force so it travels a certain distance.
Geospatial: Information related to position of things on the world map.

BABIES OF THE FUTURE

Written by Nandita J | **Artwork by** Pooja Prabhakaran

Eight-year old Vindhya had just come back home from boarding school to find out that her baby brother was born!



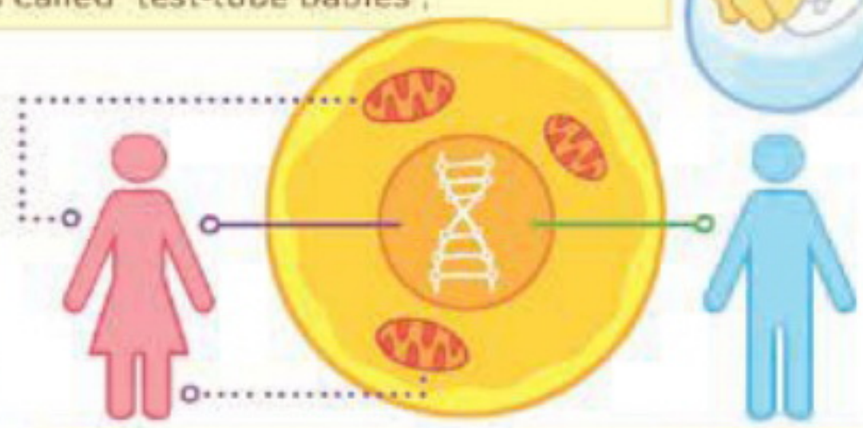


Sperm cell from the father fuses with an egg cell inside the mother to form a single cell. This new cell contains DNA from the mother and the father. This single cell grows and multiplies to form an embryo, which finally develops into a baby.

But things are not always this simple. Due to certain health problems in either parent, the sperm cell may not be able to fuse with the egg cell inside the mother's body.

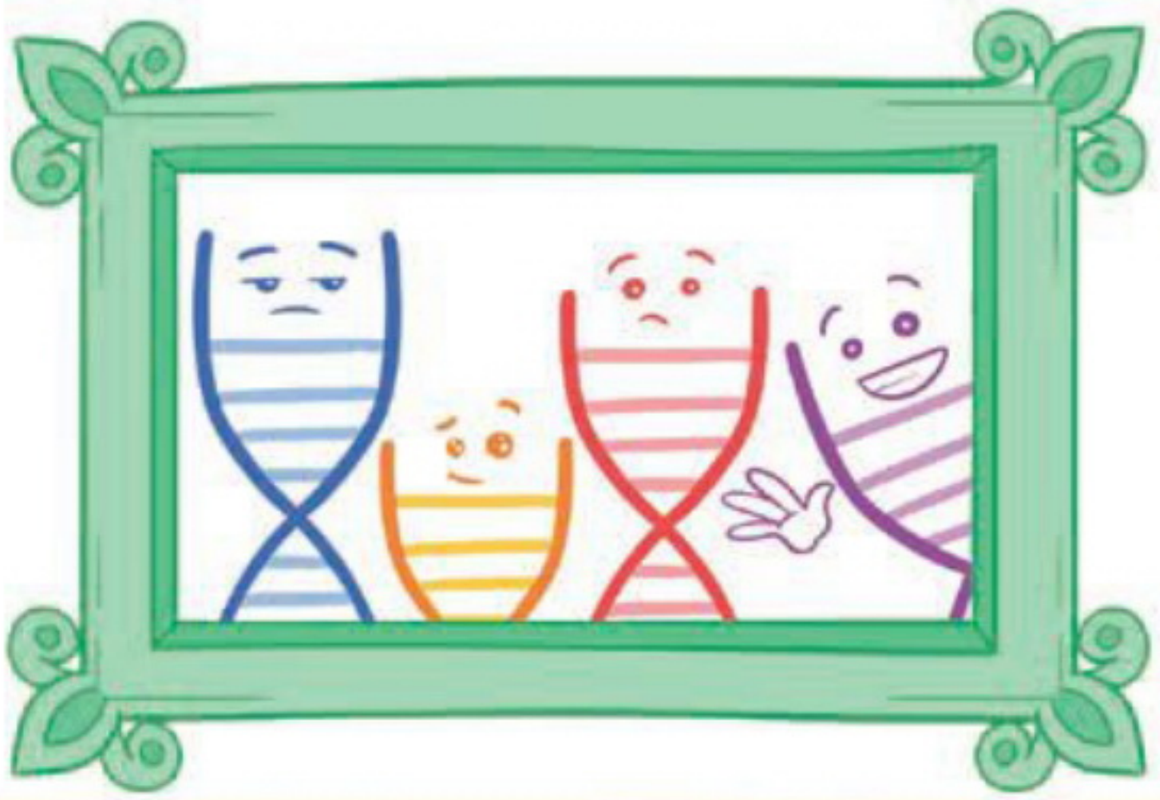
Luckily for these parents, scientists now have a way to conduct this fusion in the laboratory! Since this process takes place in the lab, babies born this way are also called 'test-tube babies'.

This embryo can either be placed back in the mother's womb where it stays for the next few months, till it is born.



The cells of our body all have DNA. Most of this DNA is located in the central 'nucleus' of the cell, but there is also some DNA, called mitochondrial DNA (mDNA) located in the surrounding part of the cell. Half of the DNA in the nucleus of our cells is identical to our mother's and the other half to our father's. Our mDNA is totally from our mother.

But when there is a problem with the mother's mDNA, it may be wiser to use the mDNA of a donor.



Though the number of genes present in the mDNA is very less compared to the DNA in the nucleus, the resulting baby will still have DNA from three different people – the mother, the father and the mDNA donor.

Another controversial possibility of the future is the "designer baby". Imagine if you could choose what characteristics you want your baby to possess. It sounds cool, but this could be a bad thing.

If scientists could tinker with DNA to ensure that the baby is less likely to develop diseases in the future, the future generations could be a much healthier lot!

THE END.

PUZZLE BOOK

TECHNOLOGY OF THE **PAST**

TECHNOLOGY OF THE **PRESENT**

TECHNOLOGY OF THE **FUTURE**

TELEPORT

Teleportation Capsule

TV

Rolled Up TV

Hover-Shoes

3D Printer

Model Airplane

Clay Pot

Pressure Cooker

Hieroglyphics

Tablet

Cell Phone

Sneaker

Artwork: Nafisa Crishna

Anil, Kala and their dog, Digger have found a time capsule buried in the park. Help them sort the objects in it, and win cool prizes.

ASK US WHY

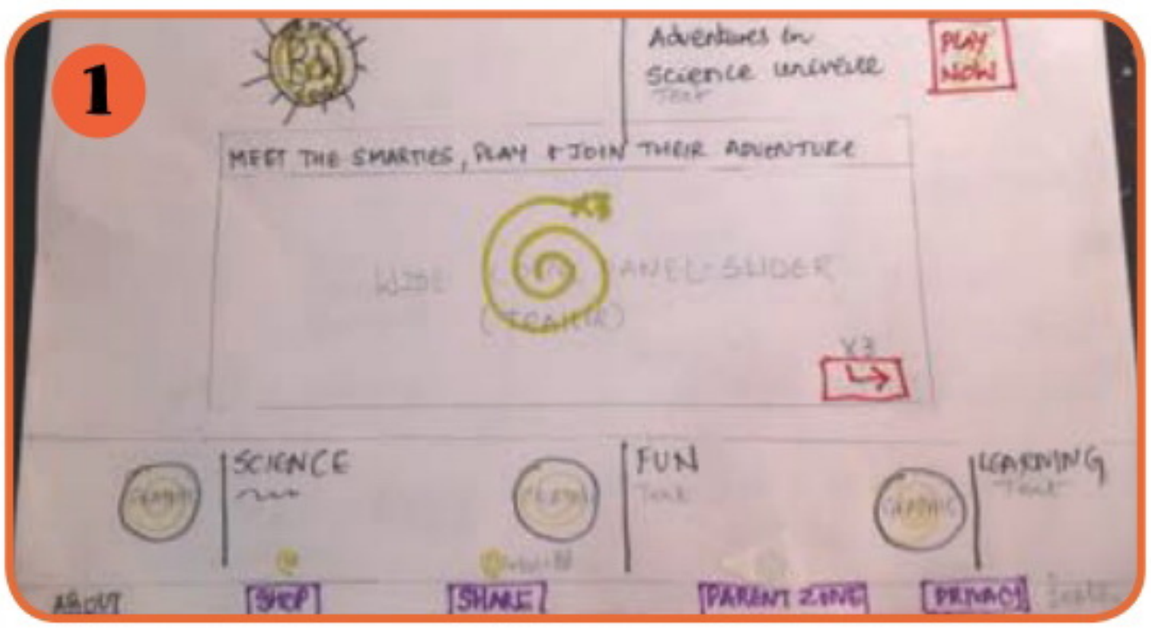
Answer by **Mahak Katyal**

Q: "How are the apps that work on our phone designed?" asks Ayush Jain

Smartphones have made our lives easier, all thanks to the apps installed in them. From playing games to reading news, these apps are convenient and fun to use. Interestingly, at Brainwave, we are designing a science games app. This is how we do that:

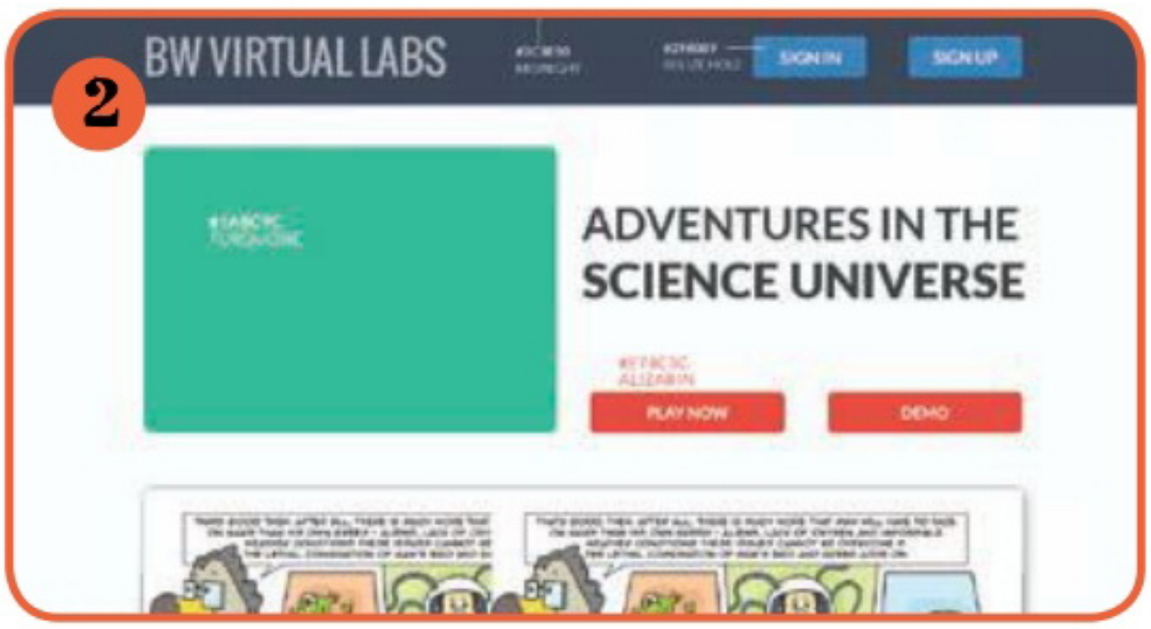
1) Conceptualisation

First, we decide what we want our app to do. This involves a lot of research and brainstorming. We make screen by screen rough drawings that contain all the elements that would be on the app.



2) Design

We then start making the front end of our app. This means literally drawing out everything that would appear on the screen, including buttons and cartoons, and arranging them in an attractive layout. We also work on the UX* so that the app would be easy to use.



3) Developing and Testing

This is the most important part of making the app. After the front end of the app is ready, we develop the back end or the software. We write code in different computer languages. The code tells the app how to function. It decides what happens when a button is clicked. We also build databases that store the data needed for the app to function well.

Once all the code is in place, the app goes through various rounds of testing and 'bugs[TH]' or errors are fixed.

Phew! It's a long journey, but there's no better reward than a happy user! ■

Have a burning science question? Email it to brainwave@ack-media.com with 'Ask Us Why' as the subject.
We will find real scientists to answer it for you.
Best questions win exciting prizes and get answered in a future issue.

* **UX:** User Experience; it contains all aspects of the end-user's interaction with the app so that his/her experience is smooth and delightful.

EXPERT TALK

Future Tense with George Dvorsky

In the future, will animals and robots have the same rights as humans? Canadian futurist George Dvorsky has spent years researching such questions.

Interview by **Nandita J**

1. What does a futurist do and when did you decide to become one?

I became a futurist 12 years ago during a time when I became increasingly concerned about the potential of technology to reshape the human species, both in good ways and bad. Specific topics that both interested me and worried me included biotechnology, robotics, artificial intelligence and space exploration.

By becoming a futurist, I could study these topics in more detail and make predictions about their potential to change the human condition, and offer recommendations for the best and safest way to do it.

Image courtesy: George Dvorsky

2. Why do you think it's important to give animals the same rights as human beings?

Certain animals are deserving of human-equivalent rights - animals that exhibit certain characteristics, such as self-awareness, empathy, complex emotions, a sense of the past and future, and so on. Specifically, these animals include all the great apes (like chimpanzees and bonobos), elephants, dolphins and whales. There are probably others - certain birds and other mammals.

Unfortunately, many of these animals are deprived of a right to control what happens to their bodies. Dolphins and whales are placed in aquariums for our amusement, elephants are placed in zoos and circuses, while certain countries still conduct atrocious medical experiments on great apes and other primates. To protect these animals, we're proposing human-equivalent rights, or what we're calling personhood designation.

These rights would prevent certain animals from undue confinement, torture, experimentation, murder, and so on. Basically, if you can't do it to a human, you shouldn't be able to do it to this select group of animals.

3. How close do you think we are to machines that can think? Should we be scared?

We are still very far away from the first true thinking machine, or what's called strong artificial intelligence. The human brain is the most complex thing that scientists have ever studied, so creating our own version will be exceptionally difficult. Realistically, we may not build AI for 50 years. Possibly more, and possibly never.

In terms of being scared, I wouldn't go that far. But we should be concerned. As humans, we've never created anything that's potentially smarter than us.

The potential for AI is that it could be MUCH smarter than us, so we might not be able to control it or even understand it. The good news is that we have lots of time to prepare for this, so we can make sure that the AI will work with us and not against us.

4. What's one thing that most sci-fi books and movies get wrong about the future, in your opinion?

Typically, most sci-fi books tend to be overly negative, or 'dystopian' (the opposite of utopia). Movies like Gattaca or Transcendence paint an overly bleak - and often simplistic - view of the future. The reason for this is that movies have to be entertaining and filled with action. But if the future is a happy place where many of our problems are solved, that would make for a very boring movie. Also, movies often fail to take human ingenuity into account.

We are excellent problem solvers, and many of the problems that we see today, such as pollution and global warming, may be solved in the future. This is where science fiction needs to go - to present more positive and optimistic visions of the future. ■

Artwork : Saudamini Tambay

SETI POEM

RAELA AND RUAN LOOK FOR ALIENS

by **Meera Guthi**

Raela and Ruan spacefarers brave,
Travel atop the stellar wave.
Dressed in their supersonic gear,
They fly through galaxies without
Fear.

SETI is what they love to do,*
Wouldn't you like to join them too?

Raela uses the powers of her mind
To search for different alien kind.
Ruan uses many scientific ways,
Including solar and x-rays.
Ruan believes radio telescopes
Might be the answer to many a
hopes.
Laser might another method be,
To communicate across the galaxy.
These signals could be picked up
By an optical telescope hub.

But our galaxies are so gigantic,
How can we the right signals pick?
Ruan must wait many ages,
To get the signals he envisages.

But Raela has a different theory
That might make you a little dizzy.
She thinks aliens are far cleverer
Than all Vulcans put together.
Maybe they are amorphous,
Changing many forms, unlike us?
Maybe they communicate
At a very different rate?
Maybe they surpass our
comprehension,
And live in a different dimension?
Raella looks for evidence
In different space elements.
Of objects floating across space,
Meteors that might have left a trace?

As the duo continue their SETI affair,*
Do you really think aliens are out there?

* Search for Extraterrestrial Intelligence

Artwork: Ria Rajan

by **Cobus Prinsloo**

Season 2, Episode 1

TIME GLIDERS

GRAPHIC NOVEL

Previously: The time craft, TG-1 has escaped certain doom after a close ordeal with the TG-2, a rogue Time Glider craft. They barely escape by jumping forward in time.

Liz, contact mission control, and warn them against the TG-2.

Err...Professor, I have to tell you something.

What is it?

I...am sorry to say that...we're not in our time yet.

Is this a joke?

I wish it were. It is the year 2030. The damage sustained to our EPS power conduit as a result of the TG-2's attack, limited our time jump capacity.

No! This is posiviely getting absurd! The odds just seem to be against us.

Aah well...we should be getting used to it by now.

And where is Quasar? He's supposed to be here for a debriefing.

It's a bit odd Prof – he isn't moving out of his quarters.

Looks like he feels ashamed of his aggressive behaviour after that fall.

Hmm...Deon, won't you go and have a chat with him?

He has obviously been able to fix his emotional subroutines. Now, his normal emotions are active again.

Me? Why me? I don't even like him.

Exactly. That's why you should go.

Grumble!

Computers don't lie, Prof!

Liz, are you sure about our time frame?

The TG-1 Team: www.bwmag.in/meet-TGs

That's strange. We are now at the night-time hemisphere of Earth, and there are no lights below us.

No indication of cities or any form of civilization. Its rather like we are in a pre-industrial era of history.

That is intriguing. Something must be wrong down there.

Let's wait until morning and go down to investigate.

In Quasar's quarters, Deon has been conversing with him.

Snap out if it, Quasar!

... in my book, you redeemed yourself by helping us get airborne back in the Cretaceous.

You certainly saved us from a lava grave by helping us get airborne using that dinosaur. How did you manage it?

This would enable me to interface with organic synaptic receptors.

While I was busy repairing myself, I got this idea and decided to upgrade my computer interface with bio neural circuitry.

Hence, my ability to connect with the dinosaur to control it.

Just like a horse! Swell...

...as long as you never, ever connect with me! And if you zap me again like you did a few weeks ago to wake me up, you're dead meat!

But...I don't consist any meat.

Aah...forget it!

As dawn breaks, Quasar is back on the bridge.

Welcome back, Quasar! Feeling better?

I am neutral, thank you, Professor.

I take it as a yes then. Deon, prepare the descent sequence to set us down at a safe distance from New York city.

I noticed on the terminal that we are in the year 2030. How come?

You missed out on some intense action back in the Cretaceous era while you were hanging on to the ship's entrance gantry, Quasar. And our ship sustained damage...again!

For now, we are going to investigate why there is a complete lack of electricity on Earth.

Ah...that explains why Mr. Deon was flying like a maniac.

The Statue of Liberty - still standing proud! But I see no visitors.

Sir, if my memory banks serve me correctly, this is the year that a massive EMP struck Earth.

EMP?

Electromagnetic pulse. It is caused by solar flares from the Sun, which can fry microchips and disrupt electronic devices.

Our Sun goes though cycles of intensity which is caused by a shift in its poles.

These cycles complete about every 20 years. When the Sun is at its maximum intensity, there is a huge increase in sunspots which shoot out charged particles and plasma as they erupt.

Prof, our sensors confirm that there is no electronic activity originating from the city.

TG-1 lands amongst buildings at the outskirts of the city.

There is no sign of human activity, and the streets are deserted.

The buildings look dilapidated, with signs of damage to their structures. People probably tried to grab whatever food and fuel they could get after this catastrophe.

That is to be expected. By the end of the 20th century, society relied completely on electricity and computers.

In fact, the whole city's energy grid became computer dependent – from communications to the regulation of transport and lighting.

No manual backup plans!

Sir, my proximity sensors are picking up multiple life signs in the buildings.

Thanks Quasar. We must see if we can assist any survivors. But, be ready for potential hostiles – we don't know what to expect..

Take away the electricity supply, and everything stops working...

...and infrastructure collapses.

...and modern society collapses. There are clear signs of looting and armed conflict here.

We are back to the dark, people!

Huh?

Stop right there!

Throw down your weapon! Have you come to pillage further?

NYPD

To be continued...

TEACHER'S GUIDE

Designed with expert advice from Brainwave Advisor, Ms. Maya Menon, Director of The Teacher Foundation.

THIS IS OUR FIRST TEACHERS MANUAL. WELCOME!

Teachers, parents or study groups can use the following lesson plan to conduct a well rounded learning experience on *Technology and Computer Science*. You will need at least one copy of this issue of the Brainwave magazine handy during the session.

This lesson plan is spread across four parts. Ideal for Grades 5 to 8 Computer Science classrooms, it can also be used for any learning environment

This is a full-fledged plan to introduce technology to students. Apart from this lesson plan, some individual articles can be used to teach specific topics; find these at the bottom of the next page.

WEEK 1

LESSON INTRO

Begin the class by basic discussion on technology.
Ask students:

- What do you think when you hear the word 'technology'?
- Give some examples of technology?
- What about technology excites you the most?
- What technology do you currently use most often?

Establish the basic meaning of technology.

LESSON MIDDLE

- Ask students which sci-fi technology they would want to see, for real, in future. Take down their responses.
- Use the web-only article 'They wrote about it first' to talk about how some sci-fi technologies have actually been brought to reality.

LESSON END

- Summarize the definition of technology with a futuristic perspective.
- Conduct a class reading of the article 'Futurescape' on page 6. Ask the class to research further on any one of the technologies described in the article and submit a one paragraph report.

WEEK 2 IN COMPUTER LAB

LESSON INTRO

- Revise the understanding of technology.
- Ask the class to identify technology around them in the computer lab.
- Declare your focus on printers.

LESSON MIDDLE

- Discuss the functions of printers.
- Conduct a class reading on 'OK to Print' article on page 4.
- Introduce a printer whose print-outs would be 3D objects. On the Internet, show them some pictures of 3D objects printed using 3D printers.

LESSON END

- Perform an origami based class-activity. Try many shapes.
- Explain to students how a 3D printer prints layer by layer, similar to paper origami.
- Offer the students an opportunity to decorate their self-made origami shapes and take them home as toys.

WEEK 3 IN COMPUTER LAB

LESSON INTRO

- Show images in the article 'Meet the bots' on page 22. Ask students to guess what each of these robots do. List the types of robots based on the class responses.
- Ask the students to come up with additional uses for these three robots.
- Organise a class play by encouraging students to act as robots, adding a fun element to their learning. 'Meet the Bots' can act as your script.

LESSON MIDDLE

- Introduce how robots and software know what to do because of the in-built program.
- Ask the students to name some computer languages.

LESSON END

- Conduct a class reading of the article 'Kodable: App Review' on page 21.
- Arrange for an iPad (if possible) and show students how this game is played. Let students take turns and try the game.

WEEK 4

LESSON INTRO

- Ask students if they have ever passed on secret messages to their friends, and how.
- Introduce to them the science of secret keeping called cryptography. Use the article 'Talking in Codes' on page 20
- Arrive at secret languages that students develop. Pass secret messages around and decode some of them with the entire class.

LESSON MIDDLE

- Encourage the students to make several groups. Each group crypts a secret code and the other team decodes it with help of 2 clues. Unbreakable code wins.

LESSON END

- Summarise all four sessions. Encourage kids to answer all contests in the magazine.

Don’t forget to send pictures of the sessions to brainwave@ack-media.com

LEARNING OBJECTIVES

This issue of Brainwave magazine also caters to the following learning objectives -

- Understanding ***Air Pressure*** with ***Multiverse*** on page 10
- Understanding ***Vacuums*** with ***High Speed Vacuum Trains*** on page 5
- Introducing ***Reproduction and Genetics*** with ***Babies of the Future*** comic on page 26 and ***Cover Story*** on page 18
- Introducing ***Gravity and Celestial bodies*** in the ***Science Fiction comic*** on page 14

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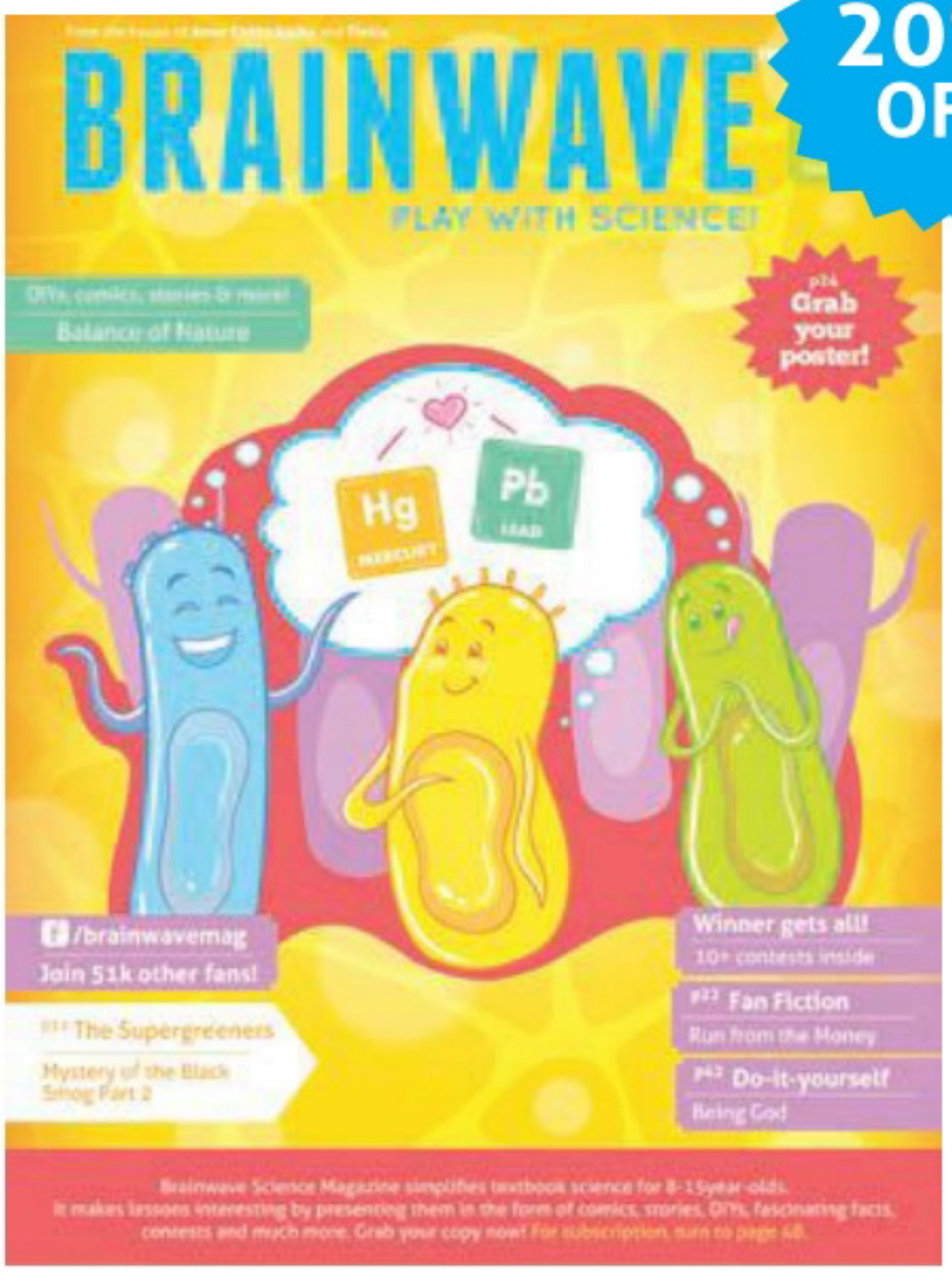

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Treasure Hunt!

You must be aware of the grind by now. The Treasure Hunt leads you to the theme of the next issue. Take your magnifying glass out and become the adventurer. Follow the words or phrases marked in purple and tagged with TH in this issue and use them as your clues.

°°°°°°°°°

Look closer and you will find enough clues to get you cracking. What are you still waiting for? Get started and finish fast, to better your chances of a win!

The top entry will get cool gifts. Email your answers to brainwave@ack-media.com with 'Treasure Hunt' as the subject.

Sci-Q Time

Finished reading the magazine? Answer this quiz to win a mystery gift worth Rs. 500!

Email your answers as soon as possible to brainwave@ack-media.com

1. How does a 3D printer work?
2. Is there an alternative to animal testing?
3. What does MagLev (of MagLev trains) stand for?
4. How do we look for intelligent aliens?
5. Name 5 programming languages.

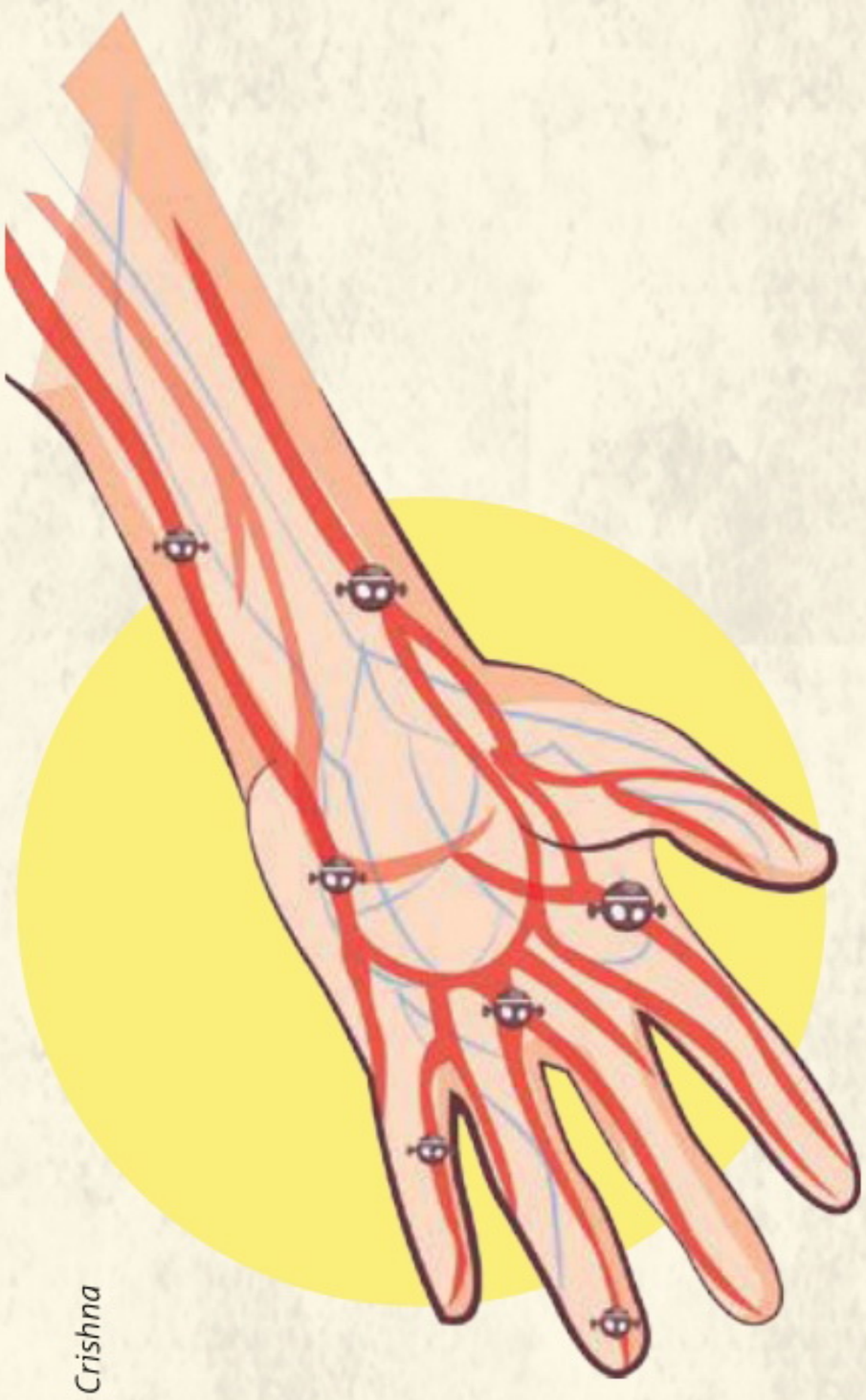
FUN SCIENCE

What Bhoo Saw...

Bhoo wants to share a vision she had about the future with us...

by **Priyanka Talreja**

Ever gotten a glimpse into the future? Well, I did. And my visions are usually pretty accurate!



Artwork: Nafisa Crishna

Little Robots In Our Bodies

'Medicine' has been replaced by 'nanomedicine'.

Each human body has numerous nano robots inside it. They are good robots, continuously maintaining the body in perfect health.

One such robot is the Respirocyte. About a millionth of a metre in diameter, this robot floats along the bloodstream, doing everything that a natural red blood cell does. Only, it does a better job! It delivers 236 times more oxygen per unit volume, than a natural red blood cell.

Kitchens Of The Future

It's not easy to feed such a massive human population. Thankfully, science has come to the rescue again.

Meat is now artificially produced in the laboratories.

Don't make a face! It tastes almost as good as the real thing. Plus, it has all the good nutrients we need, and doesn't harm animals.

All packaged food in the future is tagged with smart labels which change colour as it expires. Deserts are being 'greened' to allow more space to grow more crops.

Care For A Brand New Organ?

The whole human body is replaceable. Heart, lung, ovaries, thyroid - all can be grown from stem cells, or even be built like machines.

Improved software, longer-lasting batteries and smaller, more power-efficient microprocessors* will replace any failing organ in the human body. You name it, and it will be replaced.

Dressing Smart

Technology-enabled clothes are now the way of life.

Intelligent clothing of the future includes a solar dress that is fully charged in two hours and keeps you cool. It also charges your mobile devices with the saved energy.

GPS enabled blazers will guide you and smart bracelets will store all the data you ever create or need.

* **Microprocessors:** Tiny piece of hardware inside the CPU that computes logic functions through its circuit design.

TOP 10

They wrote about it first!

by **Payal Dhar**

Inventors often get their ideas from the books they read.
Here are 10 inventions that writers thought of, before scientists did.

1. Internet

Tom Sawyer isn't all that Mark Twain created. In an 1898 short story, the author wrote about a 'telelectroscope', a device that hooked up to the telephone network and exchanged information around the world. Much like the Internet!

2. Mobile phone

If you are a 'Star Trek' fan you'd remember Captain Kirk and his crew whipping out their communicators to contact their starship, Enterprise. Today, we do the same with our communicators. Only, we call them mobile phones.

3. Virtual reality

Doctor Who, Star Trek, and many other sci-fi books and TV shows introduced us to virtual reality decades back. Today, we use virtual reality for gaming and hands-on training, including teaching how to fly planes.

Still from 2001: A Space Odyssey

US Navy using virtual reality

4. iPad

Arthur C. Clarke's 1968 novel '2001: A Space Odyssey' contained the 'newspad' which sounds eerily similar to the iPad and other tablets we use today.

Still from Star Trek: The Original Series

5. Wireless headset

Another 'Star Trek' character Lieutenant Uhura used an earpiece that may well have been the inspiration for modern-day Bluetooth headsets.

6.
Automatic Translation

In the 1970s, Douglas Adams wrote 'The Hitchhiker's Guide to the Galaxy'. The book featured a creature called the Babel fish, which could translate any language.
The Babel fish may have been the original Google Translate!

Babel Fish

7.
Wearable technology

William Gibson's novel 'Neuromancer' featured a pair of glasses that sounded eerily like the Google Glass.

Cover of Neuromancer

8.
Self-driving vehicles

Intelligent cars and trains that navigate without a driver make frequent appearances in science fiction. In real life, parts of London's Underground and Metros of various European cities are capable of running without drivers.
Google is also working on a driverless car.

General Motors exhibit at Century 21 Exposition,1962

9.
Voice-activated computing

Another point for 'Star Trek'! The easiest way for Spock to look up information was to call out to the computer, which was addressed as... surprise, surprise: "Computer!"

Still from Star Trek: The Original Series

10.
Moon landing

In his 1865 novel 'From the Earth to the Moon', Jules Verne not only wrote about humans landing on the moon but also got a lot of the technology right!
The first human stepped on the Moon more than a century after the book was written.

Apollo 17 on the Moon